THE IRON TRADE REVIEW

VOLUME XXVIII. CLEVELAND, O. APRIL 25, 1895. CHICAGO, ILL. NUMBER 17.

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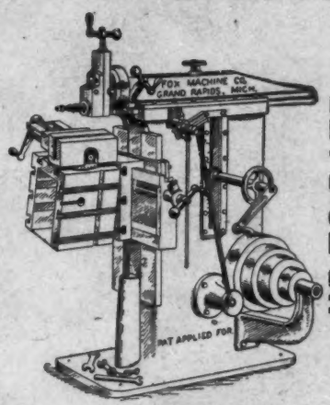

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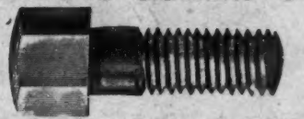

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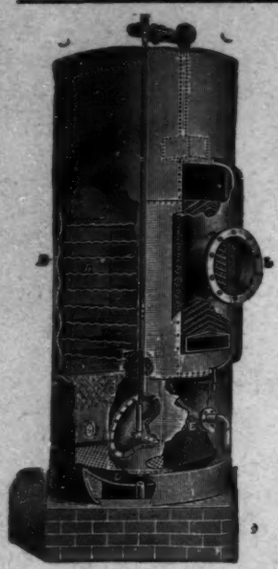

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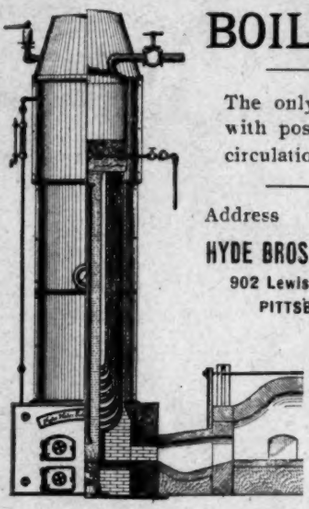

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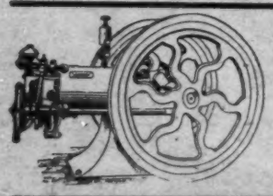

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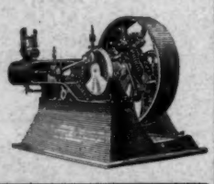

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THE IRON TRADE REVIEW

VOLUME XXVIII. CLEVELAND, O. APRIL 25, 1895. CHICAGO, ILL. NUMBER 17.

THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

Signs accumulate with every week, of the higher stage of values in iron and steel. By those who put stress on demand for finished products as the prime requisite to better prices, the permanency of the new basis is still questioned, and the absence of strong inquiry in some lines—steel rails and wire among others—is cited. It has been demonstrated, however, that advances in prices can be made and maintained by other causes than enlarged demand. Due consideration seems not to have been given these other causes in some quarters, nor is reckoning always taken of the natural tendency to work out of abnormal conditions. An advance of 25 cents in Southern iron, announced by the leading producers in that section; a slightly easier market for Bessemer pig iron, with sales at $10 at valley furnaces; a lower price on billets; an advance of $2 a ton on iron and steel sheets; a meeting of Southern bar iron manufacturers to concur in the advances made by Western mills through the new association—are the principal developments of the past week. Southern producers of pig iron are better sold ahead than for several months and believe they will maintain the advance announced. It is found that inquiry has been stimulated by the higher price of raw materials and that while little of the business done has been at the new prices, those who have long bought on the carload scale are making larger requisitions. The Eastern market is slowest to show improvement. Philadelphia reports that no business is being done at advanced prices and that buyers in all lines will exhaust their old contracts before taking hold. Iron has been sold in the Eastern Pennsylvania market the past week at as low figures as in March. Chicago had a good week in both Northern and Southern irons, with the low quotations of last month withdrawn by both local and Southern furnaces. The Pittsburg market for Bessemer pig has been slightly weaker and the leading interest closed a few sales at $10.00 in the Valley. Additional firmness has come to the market in the past few days by the banking of the four furnaces at New Castle following a strike by the men for a 25 per cent advance. The advance will not be granted and the length of the shut-down depends on the time that will be required to get together new forces, unless the strikers decide meantime to go back. The wage question promises to be a prominent factor in calculations as to the future in many lines of production. Demands for higher wages are more numerous and it is certain that labor cost will not be lower. Central Western plate mills are asking higher prices and $1 a ton better has been secured in several instances the past week.

THE CLEVELAND OUTLOOK.

Sales of iron ore continue to be made at the price heretofore named, but in no large quantities, since large blocks of the best known ores are not to be had. The fact that the first few selling weeks have recorded a total well above that of last year at the opening has led to some over-sanguine predictions as to the shipments for 1895. There are reasons for believing that these will not much exceed the total for 1894; in the opinion of some well-informed authorities, the seven-and-three-quarters millions of last year will not be passed. The failures of two mining companies led to the bringing down of considerable ore by creditors, last year, much of it unsold, and there was considerable unsold Mesabi product. In non-Bessemers it is well known that as far as quantity is concerned there is sufficient unsold on the docks to-day to make further shipments unnecessary; though certain grades not represented on the docks are sure to come down in limited quantity. Therefore, while the shipment of Bessemer ores this year will doubtless be the largest ever made, that of non-Bessemer ores will be comparatively insignificant. It would be making full allowance for the requirements to count on a shipment of 7,000,000 tons of Bessemer ore, of which 2,250,000 to 2,500,000 might be allotted to the Mesabi range. And to reach this total it will be necessary to sell in the districts east of the Alleghenies a much larger amount than was marketed there last year.

Pig Iron. The strike of employes at the four New Castle furnaces on April 23 has closed them all down, with little prospect of resumption until the men return at the old wages. The demand for the restoration of 1892 wages means $1.35 for common labor, $1.75 for turn workers, $2 for top fillers and $2.25 for keepers, against $1.20, $1.40, $1.60 and $1.75 respectively, as now paid. There is no possibility of granting the advance, at present prices, and especially in view of the fact that the New Castle men are practically paid Pittsburg wages, and were getting from 15 to 25 cents a day more than employes at other valley furnaces. Valley sellers of Bessemer pig, in view of this strike, have quoted $10.25 on May deliveries, whereas some sales were made a few days previous at $10. The steel market has been more uniform in Cleveland, in the midst of the fluctuations in Bessemer pig, than at other points. In the past week a sale of 2,000 tons of billets was made at $15.25. In foundry iron the full advanced prices have not been secured, though local sellers have been refusing orders at their March prices, and on small lots have got 50 cents a ton more in some cases. To-day's basis is $9.25 to $9.50 for cinder-mixed No. 2 and $9.75 to $10 for all-ore No. 2. Forge iron is stronger at $8.75 and $9 valley furnace.

Finished Material. Reports agree that local mills and those in the valley and Pittsburg districts have been busier in the past two weeks than for many months. Plates have been probably the most active line and from $1 to $2 a ton advance has been made, according to the condition of the mill, with 1.15c. at mill as minimum for tank steel. An Eastern mill has been rather aggressive at some Ohio points, with prices on flange steel about $2 below the general basis. Difficulty in getting out orders is more heard of than in several months. Bars and sheets are firm at the $2 advance and present prices on sheets are only guaranteed to July 1. C. L. & W. Railroad bridge work is to be let this week, calling for 500 tons of material. The new steel boat to be built at Detroit means from 1,500 to 1,800 tons of plates, etc., on which some close bidding is promised.

THE CHICAGO OUTLOOK.

[SPECIALLY REPORTED FOR THE IRON TRADE REVIEW.]

All branches of the iron and steel market are feeling the effects of the recent advances, and higher prices are being made and maintained. The market is stronger than in a long time, and appears to be growing stronger every week. Sales of material were large last week, and inquiries now being received would indicate that buyers are inclined to anticipate their wants for nearly all classes of supplies. In fact, the general tone of the market is one of strength, and it is probable that the next few weeks will see this feeling rather intensifisd than weakened.

PIG IRON.—Sales of both Southern and local irons have been very satisfactory, and the inquiry is increasing all the time. Northern iron sold in larger quantities than for some time past, and one leading producer reports a larger tonnage closed than in any one week since the first of the year. Among the large orders closed were one for 2,500 tons, one of 2,000, several of 1,000 and of 500 tons each, besides an excellent trade in smaller lots. Buyers seemed disposed to pay the prices asked readily, and very little, if any, cutting is being done. In fact, the furnaces are inclined to refuse offers which are made on large lots for long deliveries, preferring those which call for delivery within the next three months, to a longer time. Southern iron has also done well, two 1,000-ton sales being closed among others. The aggregate of business was fully as large as that of the week previous, and there is every probability that the buying in the next few weeks will be quite large. Some of the Southern producers are out of the market on certain grades, and all of them are very firm as to price. Quotations were advanced 25 cents per ton the first part of last week, and the advance is being obtained very easily from nearly all buyers. There are still some consumers who believe that higher prices can not be maintained for any length of time, but it is highly probable that these will find themselves on the wrong side of the market. Lake Superior charcoal is quiet, with only moderate buying. Quotations are now made as follows:

Lake Sup. Charcoal.....	$13 00@13 50	Southern No. 2 Soft.....	$10 00@10 25
Local Coke Fdy. No. 1...	10 50@10 75	South'n Silveries No. 1.	11 75@12 00
Local Coke Fdy. No. 2...	10 25@10 50	South'n Silveries No. 2.	11 50@11 75
Local Coke Fdy. No. 3...	9 75@10 25	Jackson Co. Silveries...	15 00@16 00
Local Scotch Fdy. No. 1.	10 50@10 75	Ohio Silveries No. 1.....	14 00@14 50
Local Scotch Fdy. No. 2.	10 25@10 50	Ohio Silveries No. 2.....	13 00@13 50
Local Scotch Fdy. No. 3.	9 75@10 25	Ohio Strong Softeners...	13 00@13 50
South'n Coke No. 2.....	10 25@10 50	Alabama Car Wheel.....	17 50@18 00
South'n Coke No. 3.....	9 75@10 00	Malleable Bessemer.....	11 25@11 00
Southern No. 1 Soft.....	10 25@10 50	Coke Bessemer	11 50@12 00

BARS.—The past week has been rather quiet as regards sales, as the large buyers seem inclined to wait a little while to see if the mills really mean to stand by their agreement. It seems hardly probable that any of those mills in the association will violate their compact, and so far, at least, no rumors of cut prices are heard. In the meanwhile, a number of the large buyers are feeling the market, inquiring of every mill agent his price. If all the inquiries in the market develop into orders, the next few weeks will see some large buying. The market is very firm at 1.10c for common iron; 1.20c to 1.25c for guaranteed iron, and 1.20c to 1.25c for steel bars from strictly billet stock.

RAILS AND TRACK SUPPLIES.—Sales were fully up to the average of the past few weeks, and inquiries indicate a good business for the near future. Prices are being maintained at $23 to $25 for rails; splice bars, 1.20c to 1.25c; track bolts, 1.95c to 2c; spikes, 1.65c to 1.70c.

BILLETS AND RODS.—Inquiries were large last week for billets and rods, and some orders were closed at the last quotations. The demand for tin plate bars is excellent. Billets, $16.50; rods, $23 to $23.50.

STRUCTURAL MATERIAL.—The only orders of any size placed were for the Northwestern elevated work, of which several hundred tons were taken by local bridge works, the material to come from Pittsburg. General business is increasing all the time, and good orders for small amounts were placed last week. Quotations are stiffer, and are now made as follows: Beams and channels, 1.45c to 1.50c; angles, 1.30c to 1.35c; plates, 1.35c to 1.40c; tees, 1.60c to 1.65c. Small lots from stock are taken at ¼c to ½c higher.

PLATES.—Business is in about the same condition as reported last week, the number of inquiries increasing, and several good orders having been taken. The local mill is filled for some time to come and will not be in the market for several weeks. Quotations are made as follows: Tank steel, 1.30c to 1.35c; flange steel, 1.50c to 1.60c; firebox steel, 2c to 5c.; boiler tubes 77½ to 75 per cent discount.

MERCHANT STEEL.—The number of inquiries received is growing perceptibly, and several large orders were placed last week at satisfactory terms. Buyers incline to the opinion that prices will be higher in the near future, as they are making purchases for quite long deliveries. Quotations are unchanged, but are very firm, indeed: Open-hearth spring, tire and machinery steel, 1.50c to 1.60c; smooth finished tire and machinery, 1.50c to 1.60c; Bessemer bars, 1.35c to 1.40c; tool steel, 5.50c to 7.50c; specials, 11c and upwards.

SHEETS.—The week has been quiet, with no orders of any size. The inquiry for summer and fall delivery is large, but the mills are not disposed to make contracts for deliveries running into the late season, as they are inclined to the belief that better prices can be obtained a little later. In fact, some have advanced their prices on the strength of the meeting last week in Pittsburg, while others have made no change, and consequently the market is hardly to be called any stronger. Quotations are made at 2.25c to 2.30c for No. 27 common iron, and 2.35 to 2.40c for sheet steel. Galvanized sheets are quoted at 70 and 10 and 10 per cent discount.

OLD RAILS AND WHEELS.—Some transactions have taken place in old iron rails, and the market seems stronger. They are quoted at $11 bid and $11.50 asked. Old steel rails are also stronger, although no actual transactions are reported. Prices are made at $7.75 to $8 for short, and $9 to $9.50 for long lengths. Old wheels are unchanged at $9.

SCRAP.—The market for all kinds of scrap is considerably stronger, and while consumers do not seem to be buying very largely, dealers are extremely anxious to get all they can, and as a consequence railroads and other scrap producers find a ready market for anything they may have to sell, at much higher prices than have prevailed for some time. Quotations are now as follows: Railroad forge, $8.50 to $9; dealer's forge, $8.25 to $8.50; No. 1 mill, $6 50; heavy cast, $7.25; axles, $13 to $13.25; cast borings, $3.75; wrought turnings, $5.25; axle turnings, $6.25; mixed steel, $6.25; stove plates, $5 to $5.50; heavy melting steel, $7.50 to $8.

IN OTHER MARKETS.

[SPECIALLY REPORTED FOR THE IRON TRADE REVIEW.]

Pittsburg. The advance toward a higher basis of prices that has been in progress for several weeks past has been made by successive spurts, with intervals of slight reaction. Two weeks ago there was a fair buying movement in Bessemer pig, with a good tonnage closed in the week following. The past week has shown

a quieter market, though several buyers have taken iron at the concessions they have been able to get from the prices of the preceding week. One steel maker has taken 10,000 tons of Bessemer pig, May delivery, at $10 in the valley. Transactions for far forward deliveries are rare and the $11.25 contract reported last week, deliveries to Oct. 1, has not been duplicated. Sellers look for another run of buying in the near future, with prices still stronger owing to the rapid using up of low-priced ores and the fact that within two or three weeks 1895 ore will be a component in some furnace mixtures. A stimulus is given the market by the advance of $2 on sheets as well as on bars, and later plate contracts are at slightly better prices. No. 27 common iron sheets are now quoted 2.30c.@2.35c. On tank plates 1.15c. is the usual minimum. Steel is dull, demand being limited in view of the large purchases being made before the advance. For May and June delivery billets have been sold at $15.70, and on April and May delivery $15.60 and $15.65 are reported. Iron skelp holds the slight advance of a week ago. Wire mills are making only a fair output. Demand is not encouraging and prices are weak; expectations are entertained of a better market in the next two months. Structural material shows no change, 1.20c. at mill being still the minimum. In foundry iron there is a firmer feeling and buyers are somewhat more willing to contract. Gray forge is in better demand and sales are reported at $9.45.

Buffalo. The large buyers have been prominently in the field this week, resulting in orders placed for a large tonnage. The rate of delivery called for indicates a heavier consumption in these lines. With a generally increased activity and former prices there is much to encourage those who are searching for better times. The impression is growing that there is no chance for mistake in buying on the present low basis, and the little talk there is of advancing prices acts as a stimulus to decide the question now. Business is still confined to strong coke irons and softeners, very little doing as yet in charcoal makes.

Cincinnati. The forces that have been gathering strength in the general iron market for a month past, made themselves decidedly felt near the close of the week. Southern irons which have been the slowest to respond to the upward tendency were advanced all along the line under very heavy sales. The advance was small—only 25 cents a ton, and the feeling of the trade is that it will be maintained with ease. The leading producer, the Tennessee Coal, Iron & Railroad Co., had kept on selling at the old schedule, not wishing to make any false start until it had over 200,000 tons of unfilled orders on its books. The other leading companies, Sloss and Woodward, are equally well sold in proportion to their capacity. The feeling of Southern makers throughout is conservative, but this trifling advance seems quite justified by the facts of the market, and it will be fully maintained, unless there is marked falling off in demand. This seems improbable at present. In Northern irons, the advanced figures are realized without difficulty. Bessemer has sold at $11 at Pittsburg, and gray forge at $9 at valley furnaces. It seems probable that the larger demand for Bessemer will divert some stacks from foundry and forge grades to Bessemer, thus relieving the pressure of these grades upon the market. Another element of strength that has developed is the scrap situation. Railroads have forced scrap to sale for two years past, to provide ready money. The result has been an excess supply and exceptionally low prices. Now it developes that the roads which have forced the material for sale are bare of all kinds of scrap, while the roads which have been holding on are very bullish in their views. Scrap dealers are quick to see the situation, and a short supply and higher prices are the result. It is believed the effect will soon be felt upon forge irons which have so long been stagnant because of very limited puddling. The condition of things illustrates very well the general law that evils and inequalities in the trade have a tendency to cure themselves. We make no formal change in quotations but the close is strong, with an advancing tendency.

St. Louis. A marked improvement in the iron market has developed during the week just ending. The demand has been exceedingly lively. Buyers have felt for several weeks that iron had touched bottom, and the advance in prices by the Southern furnace companies only coincides with the increased values of Bessemer pig, bar iron and other products. The advance, while slight, has already awakened interest and given new life to the trade.

Personal.

Jonathan Warner, a pioneer mine owner and iron manufacturer of the Mahoning valley, died April 18 at the home of his daughter, Mrs. Myron I. Arms, at Youngstown, O., aged 87 years. Between 1846 and 1855 he built and operated several furnaces about Youngstown and developed coal and ore properties. In 1858 he built two furnaces at Mineral Ridge, operating them for 15 years. He also opened up coal property at Brazil, Ind. Mr. Warner was one of the organizers of the Republic Iron Co. and was prominent in the development of its well known Marquette range property, being president of the company up to 1875.

W. G. Pollock, of J. H. Outhwaite & Co., Cleveland, interviewed at New Castle, Pa., made this statement about the outlook for Bessemer ores: "There is every indication of a substantial revival in the iron business; since last October the furnaces have been turning out over 100,000 tons of Bessemer iron every week, and yet with this enormous output of Bessemer, the largest ever known, the furnaces have little in stock. It has all been sold and worked up. This of itself shows a marked increase in business and a returning confidence that is the basis of industrial as well as commercial health. I do not look for any boom, but all the signs point in the direction of a steady, healthy demand in the iron world."

A number of American steel masters are now in Europe. R. P. Linderman, president of the Bethlehem Iron Co.; J. G. A. Leishman, president of the Carnegie Steel Co.; H. W. Lash, general manager of the Carbon Steel Co.

H. C. Frick has presented to Mt. Pleasant, Pa., the town in which he started as a clerk 30 years ago, five acres of ground to be used as a public school park. He had previously given the schools an observatory.

Geo. H. Fisher has resigned the superintendency of the Eagle mill at Ironton, O., to become superintendent of the Knoxville Iron Co.'s rolling mill at Knoxville, Tenn.

W. J. Keep, of Detroit, contributes a paper on "Tests of Cast Iron" to the spring meeting of the Iron and Steel Institute to be held in London, May 9 and 10. At the same meeting the Bessemer gold medal will be awarded to Mr. H. M. Howe, of Boston, who contributes a paper on "The Hardening of Steel."

WHILE not reaching its exceptional record of 2,100 tons in a week, as published some time ago, Rosena furnace, at New Castle, Pa., has been regularly making a large output, quite uniformly exceeding 1,900 tons a week. For last week the record was 1,965 tons. Fifty per cent of Mesabi ore is being used—42 per cent of South Side and eight per cent of Oliver.

JOHN FRASER, engineer, 1436 Monadnock Blk., Chicago, has let the contracts for the erection of all the buildings for the Chicago Truck & Steel Castings Co. to W. B. McMullen, contractor, of Kokomo, Ind. The company expects to be producing steel castings in 60 days.

THE IRON TRADE REVIEW

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APRIL 25, 1895.

FOUNDRY WAGE QUESTIONS.

An effort is now making by machinery molders at several points, notably Cleveland, to secure a return to the old minimum wages of $2.50 from the $2.25 that has prevailed the past year. Varying answers are returned by the foundrymen. Some who are comfortably supplied with orders have returned to the old wage. Others give answer that the condition of business does not yet warrant such a step, and are willing to try conclusions with the men in a strike if that be decided on as the only alternative. Among stove foundries the conditions of trade have been distinctly better than in machinery lines and the recent decision of the joint committee of the molders' union and the manufacturers' association to continue the scale of 1894 was arrived at without difficulty. The stove molder has had the exceptional good fortune during the past two years of depression, to have his wage untouched by the reductions that have invaded practically all manufacturing lines, and having gone through the worst of the storm at the old wage basis, the foundrymen cou'd hardly find a reason for making a reduction now that the clouds are lifting.

It will be agreed that the stove manufacturers have maintained their position in a remarkable way in the trying months since May, 1893. Demand fell off, to be sure, and in many cases their foundries were shut down. But the strain of shrinking business was not sufficient to drive the trade into indiscriminate price-cutting. Wages were maintained, and the molder's hardship was confined to the shortening of his work days, while molders in other lines stood the double cut of lessened wages and shortened time. With the lessening of their output, and wages and fixed charges remaining the same, stove manufacturers found their cost per stove considerably increased, and their association was not slow to take the stand that under such circumstances, if ever, prices must be maintained.

So it has come about that the consumer has been paying practically the old price for stoves, and manufacturer and workman came out of the depression on the same bases on which they went into it, with the prospect that the former will reap the benefits of a gradually increasing output and the latter the benefit of more active hours in the week.

But if stove manufacturing has thus been preserved from some of the worst effects of the depression, machinery and general jobbing foundries have been in the depths of demoralization. There was no association to secure uniform wages and selling prices. And as work became scarce, because machinery of all kinds was practically without a market, competition for the little work that came up went to a point that cut out all profit if it did not mean more loss to the foundry getting the work than to the one that lost it. Many foundrymen who had pig iron coming to them on long contracts were brought in competition with those who bought from hand to mouth, following the various declines in raw material, and in meeting the prices of the latter were tempted to make figures that meant positive loss. And so the struggle has gone, from bad to worse, with operation a losing game, but persisted in because of the necessity of holding established trade. To many who have gone on in this way the demand now for a restoration of the old wage is a positive hardship. No advance has taken place yet in the price of castings. Many contracts at panic prices are still unfulfilled, and in not a few instances the founder who has bought his pig iron from month to month may have to finish out his contracts with iron 50 cents a ton higher than he figured. It would seem that the hardship of such employers should be considered in the movement for higher wages, and that an approximation to a paying basis should be reached before labor cost is jumped up 11 per cent.

The course of events in stove founding, as will be seen, is far from being a criterion for the general jobbing and machinery interests that have been harrassed beyond all precedent.

GERMAN IRON CROWDING FORWARD.

The complaints that keep coming from British iron and steel producers, of the incursions of German competitors, not only in colonial markets, but even in England itself, have drawn more and more attention to the German iron industry, particularly in view of the fact that pig iron production in the latter country has been steadily increasing. In January and February of this year, for example, the output was 924,279 gross tons in Germany and Luxemburg against 829,792 tons in the first two months of 1894. British comment on the aggressive policy of German manufacturers finds a special grievance in the fact that a protective tariff makes profitable prices at home for German mills, while a profitless price or one considerably below cost is made on exported material. The push for large tonnage, to keep the mills in steady operation and thus reduce the unit of cost, has led to a more and more general adoption of this policy. The British manufacturer with every port open to outside competition, has no home advantages; and judging from the trend of some of the comments in London iron trade journals of late, he is seriously questioning what shall be done to save his own market. Special stress is put upon the increasing exactions of labor organizations, and labor leaders are warned that there is a suicidal tendency in much that they have been agitating of late. The eight-hour day, for example, is being contended for among engineering and kindred industries and the support given the workingmen's contention by politicians of all parties is a feature of the situation that is giving capital no little concern. Robert P. Porter, writing of his recent investigations in London, says in this connection:

> We find the labor interests far better organized here than with us. Both the great political parties are committed to reforms and legislation that, if carried through, will make Great Britain the paradise of skilled labor, provided the enhanced cost of production which must follow does not make competition with foreign countries impossible.

Competition with other countries, heretofore welcomed

by British manufacturers who felt secure in their low costs, is now taking on a far different aspect. What Germany's part has been is gathered from the figures showing pig iron production in that country in the past few years. As a matter of interest we put side by side the output for the United States and Great Britain, going back to the year 1889:

PRODUCTION OF PIG IRON—GROSS TONS.

Year.	United States	Great Britain.	Germany.
1889	7,603 642	8,322,824	4 453,861
1890	9,202,703	7,904,214	4,605,662
1891	8,279 870	7,406,064	4,568 698
1892	9 157,000	6 709 255	4,899,313
1893	7,124,502	6,976,990	4,908,097
1894	6,657,383	7.364 745	5,331.375

It will be noticed that 1893 and 1894, and for reasons well known, are the only years in which the total pig iron production in the three countries has fallen below 20,000-000 gross tons. Further, while the German output was 23.6 of the whole in 1892, this percentage increased to 25.7 in 1893 and to 27.5 last year. While Great Britain took first place last year, there is no question that the United States will resume the lead in 1895, and from indications that are strengthened month by month, the gap between Great Britain and Germany will be much narrower when another year's statistics are written.

The New Akron Iron & Steel Co.

The Akron Iron & Steel Co., which succeeds the Akron (O) Iron Co., has elected officers and directors as follows: H. F. Holloway, New York, president and treasurer; Lewis Miller, Akron, vice-president and W. A. Pardee, Akron, secretary. The board of directors is composed of J. A. Long, chairman, H. F. Holloway, George E. Clifford, Theophilus King, S. L. Severance, Charles Steese, Lewis Miller, Judge Wm. H. Upson and E. B. Miller. The executive committee consists of J. A. Long, chairman, Lewis Miller, H. F. Holloway and Charles Steese. After May 1, it is expected that the plant will be run under the new regime to full capacity. Several members of the new board of directors represent certain banking creditors of the Akron Iron Co. H. F. Holloway, the newly elected president of the company, entered the employ of the Akron Iron Co., 18 years ago, having a responsible position in connection with its furnace, coal mine and iron ore properties in the Hocking valley. Later, when these properties were merged with other furnaces in the Columbus & Hocking Coal & Iron Co, he went to Columbus as assistant secretary of that corporation. For a number of years he has been at the head of the Eastern business of the Akron Iron Co., having direct charge of the New York house, 206-208 Fulton st., with the Boston and Philadelphia offices tributary to it. His choice as president of the new company was the unanimous wish of the creditors of the old company and of its officers and endorsers, and was a merited recognition of high ability and the building up of a strong business in the East. J. A. Long, who has been identified with the Akron Iron Co. for so many years, takes an important place in the new organization as chairman of the board of directors and of the executive committee. W. A. Pardee, the new secretary, has for a number of years had a responsible position in the Akron offices of the company. A strong official list gives good promise for the new company's future.

Some Noteworthy Test Bars.

A number of test bars received at the offices of M. A. Hanna & Co., Cleveland, in the past few days indicate with what interest progressive pig-iron selling firms are studying the problems encountered by their customers, and demonstrate the success attained by advanced furnace practice in meeting the wants of foundrymen. The bars are of varying length, one inch wide and ⅛-inch thick. They were made at the foundry of the Fulton Foundry & Machine Works, Brooklyn, N. Y., under the direction of Thos. Scott, the well-known salesman of M. A. Hanna & Co. The mixture contained a little over one-third of Buffalo iron, a small percentage of Ashland and a Southern iron, and nearly fifty per cent of scrap. Machinery castings are the output of the foundry, a considerable portion being small castings, and the combination desired was strength and sufficient softness and fluidity to make clean-cut castings in the finer work. That this was attained is evidenced by the fact that one of the bars is five feet long and was cast flat, with a single gate at the end, the metal running freely the full length of the green sand mold, and the test bar showing a uniform iron without chill. The shrinkage is one-eighth inch to the foot.

The scrap-carrying qualities of the Buffalo iron are being impressed on the foundry trade by a bronze desk weight recently sent out by the makers. On the back of a statuesque buffalo is piled a heavy burden of scrap, Southern and hard iron, which is being carried in an every-day sort of way indicating a confirmed habit.

Pennsylvania Stove Plate of 1800.

Mr. John Marshall, of the firm of John Marshall & Co., founders and machinists of Kittanning, Armstrong county, Pa., has presented us with a valuable relic of the early iron industry of Western Pennsylvania. It is a stove plate, about 18 inches long by 6 inches wide, bearing the inscription, in well-shaped letters, "Westmoreland Furnace. John Probst. 1800." The furnace mentioned was built by John Probst, a German, about 1792, and was operated until about 1810. It was located on Four Mile run, near Laughlinstown, in Ligonier Valley, and was the first furnace built in Westmoreland county, which afterwards contained many charcoal furnaces, now all passed away. One of these furnaces was built by General Arthur St. Clair near Ligonier about 1802. John Probst also built a small forge about the time he built the furnace. The latter was in operation in 1795, when George Anshutz, the manager, advertised stoves and other castings for sale, and the stove plate sent to us by Mr. Marshall proves that it was in operation in 1800. We thank Mr. Marshall for his most acceptable present. He writes us that he obtained the stove plate about a year ago from an old farmer, from whom he also obtained the whole of the stove.—[Bulletin.

Another Large Lake Boat.

The Cleveland & Buffalo Transit Co. has just awarded the contract for building its new sidewheel steamship to ply between Cleveland and the foot of Lake Erie, to the Detroit Dry-Dock Co. Four shipbuilding companies bid on the boat, including the two in Cleveland, but the Detroit price was lowest by about $50,000. The cost is expected to be in the neighborhood of $350,000. The new steamer will be 308 feet in length over all and 296 feet on the water line. Her molded beam is to be 40 feet 6 inches, and her depth 17 feet. The specifications require that the hull shall be of open hearth steel, with a tensile strength of 60,000 pounds, with an elastic limit of at least one-half the ultimate; elongation at least 45 per cent in eight inches, and the proportion of phosphorus not to exceed .075. The best methods of inspection and most thorough tests will be made. The steel decks are to be covered with wood, and the wheel batteries, bulkheads and boxes will be steel. Her engines will be of the compound, walking beam type, with low pressure cylinder 76 inches in diameter, and a stroke of 12 feet.

Production of Soft Steel in the Converter.

Some interesting experiments have for some time past been in course of prosecution at the Acieries de France, at Isbergues, with the view to producing soft and very soft steel in the Bessemer acid converter by the silicon superheating process introduced by Messrs. B. Walrand and Legenisel. From the results obtained it is hoped shortly to be possible to produce in the converter, in place of the ordinary Bessemer steel, an extra soft metal hitherto capable of production in the basic converter only.

"H. W.," *Iron Trade Review* office, is in the market for a rail shear, new or second hand, capable of shearing soft steel in section of 3″ square.

A SALE of 62 per cent Mesabi ore close to the Bessemer limit has been made at $1.85.

PIERCE-CROUCH GAS ENGINE.

Both vertical and horizontal types of the improved gas engines manufactured by the Pierce Crouch Engine Co., of New Brighton, Pa., are shown in the accompanying illustrations. The company's plant is well equipped and in the year or more since manufacturing was begun a number of improvements have been made in the engine, the two views given in Figs. 1 and 2 being of the last design. Economy, simplicity,

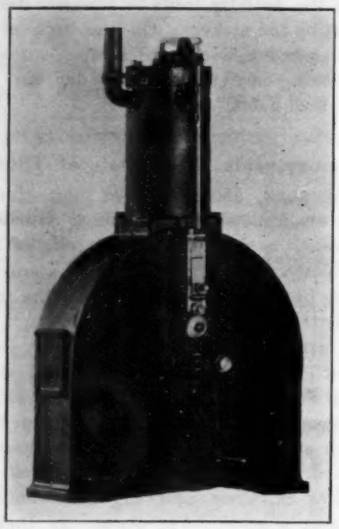

FIG. 1.

closeness of regulation and compactness are the special claims of the makers. A departure from ordinary gas engine building is made in the method of placing the fly-wheels inside the journal bearings, with built-up crank shafts, discs being cast in and a part of the fly-wheels. Hard machinery steel shafts are forced into holes in the discs. A higher grade of steel can thus be used and sudden strain absorbed without twisting and springing. The bearings in which the shafts rest are bushed with hard bronze and provided with automatic ring-oilers. The valves are of poppet form and inclosed in separate and removable valve casings, capped over. A patent alloy tube heated to incandescence is used to ignite the charges. An electrical igniter is provided if desired. The governor is said to be simple and positive in its action, responding quickly to variations in speed, and adjusting itself to maintain regular speed under varying loads. Good results are attained in electric lighting on this account.

The small vertical motor, of the pattern shown in Fig. 1, is made in three sizes—one-half, one and two actual horse power. Fly-wheels are enclosed, making the engine clean, no oil being thrown and no oil cups being needed. The crank dips in oil each revolution and thus oils the cylinder and bearings. The one-half horse power engine stands only 22″ high over all, with base 14″ x 6″. The one horse power engine is 30″ high, with base 21″ x 8″. In the two horse power machine, the height is 40″ and the base 24″ x 10″.

The makers estimate the cost of fuel where natural gas is used, at $4.00 a year, running 10 hours a day, and $20.00 a year for artificial gas. In the large sizes the consumption has been 10 cubic feet to actual horse power per hour and

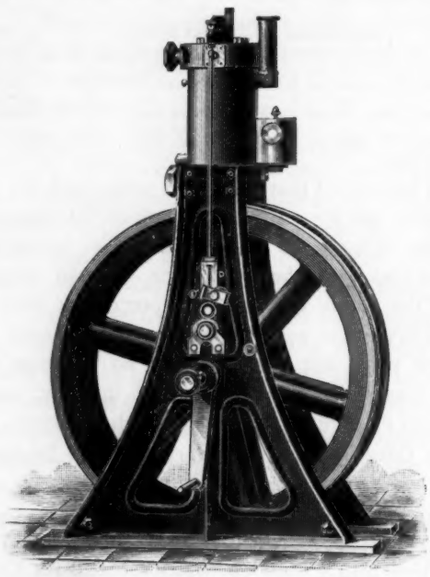

FIG. 3.

15 cubic feet in the smaller sizes below four horse power. A heat efficiency of 25 per cent is found in sizes up to 15 horse power and greater above that. All the engines are tested on natural gas as well as artificial gas.

The manufacturers guarantee that not more than 15 cubic feet of gas per horse power per hour will be required, if the quality is equal to that used in their shops. Contracts are taken for complete electric light plants, including engine, dynamo, lamps, wiring, etc. In Fig. 2 the latest horizontal type of the engine is shown, the sizes being from five to sixty horse power.

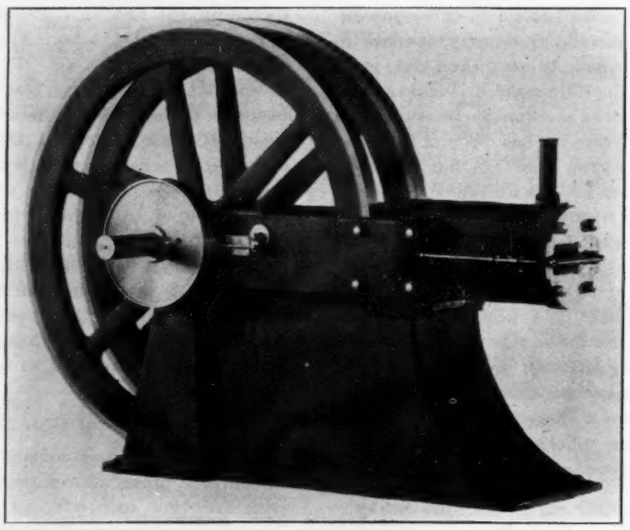

FIG. 2.

Fig. 3 is the vertical type unenclosed, of three and four horse power.

FIRE, April 23, in the works of the Ajax Manufacturing Co., Cleveland, builders of bolt-heading and forging machines, caused a loss of $20,000 to the firm, A. E. Blakeslee and J. R. Blakeslee, Jr., and $5,000 to W. H. Brue, owner of the building

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THE use, manufacture, tests and inspection of cast iron water pipe are detailed in an interesting manner in *Cassier's Magazine* for May, by Frederick H. Lewis.

MULTIPLYING LATHE TOOLS.

It is evident that many men have been impressed with the wastefulness exemplified by the exhibition displayed on the tool board of lathes and planers in the every-day machine shop, where each workman is a law unto himself, and, like the state of society that would result from a general application of the principle, an awful warning to the rest of the world. If this were not so, then why these numerous attempts at solving the problem of an effective tool holder?

The unfortunate facts must always be remembered that few men are as saving of their employer's money as they would be of their own; that a small percentage of workmen can appreciate the value of little things; and that each individual has an opinion of his own as to the best method of doing a job in hand. Therefore, it matters little to them that an extra tool is forged for each change of job and for each particular change of form, and that when the job is done or the tool dull it is put on the tool board exhibition and the social formalities of superintending the formation of a new tool proceeded with in due course. A fresh piece of steel, a few moment's chat; a little grinding at the wheel; a loss of temper—not by the man, however, who is always too calm and contented for that—a re-heating; a re-tempering; a mere passing of the time of day just to maintain the amenities of life between the blacksmith shop and the machine shop; an attempted adjustment of the tool in its post to find that it needs a little more clearance, and we have an aggregation of trifles, any one of which is too small to speak about, but which as a whole may add a pretty penny to the waste account of the month.

Now there is no denying that new tools must be made and that odd shapes must, at times, be used; but there is no sense in giving every man in the shop *carte blanche* to order whatever his fancy may dictate. I have seen men work for months on all sorts and varieties of work with a diamond point, a right and left-hand facing tool, a cutting-off tool, a square-nosed finisher and a boring tool, while the tool board of their next neighbor would be lumbered up with all manner of goosenecks and diamond points of all degrees of clearance and angles of cutting, and yet not turn out as good work as came from the lathe with the simpler bit.

The remedy for the waste and multiplicity lies in getting out a few standard tools in quantities. If a blacksmith works for ten hours on the job he can form a large number of these tools. Let them be ground and ready for use; then, if a tool gives out, there is another ready to the hand of the workman to take its place, and the old one goes to the repair box. After a sufficient number have accumulated, the blacksmith may put in a day at tool dressing. I am urging the application of this principle in small shops where from three to a dozen men are employed, where the proprietor is perhaps his own working foreman and where there is neither the work nor the space for a regular tool room. There is no reason why, because the shop happens to be a small one, there should not be a systematic endeavor to save on little things.

This much can be said to the man who uses the ordinary type of lathe tools, but when I find a man who has a dollar to spend that he may save ten, I suggest the use of tool holders. There are several inexpensive ones upon the market that are adapted to a wide range of work and for which no tool dressing is necessary. A bar of Mushet steel is the material and the equipment of the tool dresser consists of a cold chisel and a hammer. A bit is cut off, ground to a cutting shape, fastened in position and the work goes on. Mushet steel lends itself with great facility to this sort of a proceeding, as it needs no shaping which is much more difficult with it than with steels of the ordinary grades. If this method of working is adopted it is well to have a rack containing an assortment of the most widely used styles and sizes ready for application.

Don't say that this is impracticable for it is not. I know that it seems to require less time to dress one tool at a time as required for the work in hand, but in reality you know very well that such is not the case, and if you can only get rid of the idea that a hand-to-mouth existence is as undesirable in the machine shop as it is in daily life, and then make one desperate effort to shake yourself free, you will be very reluctant to start a new tool board exhibition of scrap ends of steel, after having once experienced the satisfaction of knowing that it did not cost more for tools than for the job.—[Dixie.

RECEIVED FROM THE TRADE.

The Ferracute Machine Co., of Bridgeton, N. J., Oberlin Smith, president, has just published catalogue No. 11, of its foot and power presses for working bar and sheet metals. Their machines for shearing, punching, bending, forming or drawing number upwards of 300 sizes and varieties. The presses of latest design are built in the same style as first-class machine tools, being fitted up with carefully scraped working surfaces, steel shafts, steel pitmans, hardened steel clutches, milled and case-hardened adjusting bolts and nuts and drop-forged wrenches. All gear teeth are cut from the solid metal.

Heavy machine tools for working plate, bar and shape iron and steel are the well known specialties of the Hilles & Jones Co., of Wilmington, Del. Catalogue J, which is of folio breadth, contains numerous half tones of heavy tools adapted to ship-yard, boiler shop, bridge and car works uses and general plate and shape iron working. Chief among them are single punches and shears, combined punches and shears, plate bending and straightening rolls, beam coping machines, angle iron shears and plate planing machines.

Roots' rotary positive pressure blower is described in 30 pages of attractive letter press with sectional and elevation illustrations. The catalogue before us refers to the large amount of special machinery placed in the Roots' works at Connersville, Ind., the past year, and affirms that a higher standard of mechanical excellence has been attained than ever before.

"The Sturtevant Engine—Catalogue No. 81" is the handsomely embossed title of the latest literature from the progressive B. F. Sturtevant Co., of Boston. Well known for their successful blowers, the company has attained no less a reputation on its automatic upright engines for electric lighting and general high grade work. A record of over 3,500 upright engines built and sold since the designs illustrated in this catalogue were perfected is a guaranty of good design and the filling of service requirements. Illustrations and details are given of the single valve upright engine, double engine—enclosed and open types—and the compound enclosed upright engine. Half-tone views are given showing the possible combination of these engines with various types of well known generators. The height of the center of the shaft above the base and the dimensions of the latter have been made to facilitate the attachment of the engine, with any ordinary design of dynamo, to the same bed casting.

Free Laboratory for Foundrymen.

The establishment of a chemical laboratory for the joint use of members has been under discussion at various times by the foundrymen's associations east and west, but neither association has come to the point as yet, of investing in equipment and hiring a chemist. The want is to be filled, however, as is indicated in an announcement just made by Rogers, Brown & Co., of Cincinnati. The firm says in its circular that it will open at its central office at Cincinnati a foundry laboratory to be in charge of Ralph K. Gratingy, who has supplemented chemical work in connection with iron and steel works, with practical acquaintance with the trades of molder and pattern-maker and a study of cupola and blast furnace practice. The scope of the proposed laboratory will include physical tests of mixtures, chemical analyses, and experiments to locate and correct faults of iron that give foundrymen trouble, to get more economical mixtures producing equivalent results, and to work upon problems whose solution would advance foundry practice. The use of this laboratory is free to customers of the firm. In other cases low charges will be made. The circular says in conclusion: "We need not expand upon what every intelligent iron manufacturer so well knows—that hundreds and thousands of dollars are wasted in most of the large foundries of the United States every year, because the mixing and melting of iron is done on the haphazard plan. The object of our venture is to afford the cheapest and most practical possible way for busy foundrymen to keep abreast of the latest things in the scientific world as applied to their art."

THE General Electric Co. is talking of locating a large plant either at Cleveland or Buffalo.

EXPANSION OF CAST IRON IN SOLIDIFYING.*

BY E. D. ESTRADA, M. E.

The question whether cast iron expands or contracts in passing from the liquid to the solid state, has been under discussion for a number of years. In 1874 Robert Mallett communicated to the Royal Society the results of his experiments on this subject and concluded that contraction and not expansion, as had been alleged, occurred in the change of state. While it is not the purpose of the writer to enter into a minute discussion of the experiments of others, it will be proper to call attention to the uncertainties involved in Mr. Mallett's method, his object being to determine the specific gravity of liquid iron and compare it with that of the same iron when solid. To do this he proceeded as follows: After having determined the capacity of a circular vessel of wrought iron, it was filled with molton iron, additions being made from time to time as required by the expansion of the vessel. After being left to cool for three days, the wrought iron case was removed and the cast iron found to weigh 647.18 lbs. The capacity of the vessel, when at its highest temperature, was estimated to be 2,691.77 cubic inches, and since the molten iron supposed to have occupied this space weighed 647.18 pounds, the specific gravity of the molten iron was found to be 6.65. The specific gravity of samples taken from the casting was found to be 7.17.

A determination of the capacity of a vessel such as used by Mr. Mallett, at the temperature which he assumed (2,400° F.) cannot be made with any degree of accuracy, because, while it may have been possible to determine the rate of increase in the capacity of the vessel within a very low and small range of temperature, it does not follow that the same rate would have applied to equal differences of temperature within the assumed range. Supposing that the temperature of the liquid iron when poured in the vessel was in reality 2,400 degrees F., and that its volume was 2691.77 cubic inches, due allowance should have been made for the contraction of the liquid, before reaching the temperature of solidification.

It may be interesting to mention here the fact that, according to Daniel and others, cast iron solidifies at about 2,786 degrees F. Further, if 7.17 represents the specific gravity of the samples taken from the casting after it had been cooling for three days, these figures could not represent the specific gravity of the same samples, if taken immediately after solidification, as in that event the specific gravity undoubtedly should have been less, since the iron contracted in cooling from the temperature of solidification to that of the atmosphere.

It is not in a spirit of ridicule that the writer criticises Mr. Mallett's method, but because his conclusions are considered as proof positive that cast iron contracts in passing from the liquid to the solid state.

In 1879-80 Mr. Wrightson, in a paper read before the Iron and Steel Institute of Great Britain, proved to the satisfaction of such men as Dr. Siemens, Sir Lowthian Bell, Mr. J. E. Stead and several others, that cast iron increased in volume in the passage from the liquid to the solid state. Mr. Wrightson evidently did not succeed in convincing everybody, since a few years after his paper was read, Mr. Charles Markham read a paper before the Institute, and his conclusions were directly opposed to those arrived at by Mr. Wrightson. However, during the discussion which followed the reading of Mr. Markham's paper, it was clearly shown that Mr. Markham's methods were incorrect, in so much that had the expansion occurred, the fact could not have been determined by his observation.

The descriptions of several other experiments have come under the notice of the writer, but in every case either the difference in the physical condition of the iron when at the atmospheric temperature, and at the temperature of solification has been entirely ignored, or the determination of the volume of a given quantity of iron, when liquid and when solid has been inaccurately made. It matters not how small or how large the increase of volume is. The important point is to determine whether there is or is not an increase. That done, there is an end to the question. What benefits may be derived by a knowledge of the fact, or to what practical use such knowledge may be put, is beyond the power of any one to predict.

In the experiments here described, it will be noticed that no attention has been paid to the percentage of increase in volume. The trials were made merely to ascertain whether increase or decrease of volume takes place in the passage from the liquid to the solid state. A wrought iron tube was placed in the center of a flask, and then surrounded by molten iron. When the tube became red-hot, it was filled flush with liquid iron from a hand ladle. Immediately after the tube had been filled, the upper surface of the iron in the tube was chilled by means of some waste previously soaked in cold water. Soon after this operation, molten metal began to ooze from the top of the tube, solidifying quite readily.

A similar tube, heated to a temperature of about 150 degrees F. was placed near the flask and filled within about one inch from the top with liquid iron from the same ladle as the first one. Water was poured in the cavity at the top. The results obtained in this case were the same as those in the previous one, but not to such a marked degree. The same trial was made by pouring liquid iron in a tube previously heated to a light cherry red, and then allowing the tube and its contents to cool under atmospheric conditions. Two days after the experiments were made, the tubes were cut longitudinally, and it was found that the castings in the tube placed outside of the flask were practically solid throughout, and the one placed in the flask had large cavities near the center, and several small ones near the surface. [The specimens were presented for inspection].

Notice that the castings in the tubes which were hot before the iron was poured, do not exhibit any signs of shrinkage, while the casting in the cold tube does so. Notice, also, that the large cavities in one of the tubes are not due to the gases generated. A volume of gas with a pressure sufficiently high to raise the liquid above it, would not leave the surface of the cavities as they are found. It is evident that the volume of the iron in either tube was smaller while in the liquid than in the solid state. This being granted, we must admit that expansion takes place at the moment of solidification.

At the present time the popular opinion among foundrymen, engineers, chemists, etc., is that a contraction takes place. A writer on cast iron has lately expressed his opinion on the subject as follows: "The question has been raised, whether cast iron expands at the instant of solidification. There is no such instant. Each crystal forms alone and shrinks on itself, and even if it did expand, it is not until such crystals are numerous enough to form a rigid shell, that the casting can shrink, and any expansion of the crystal could not affect the whole casting. Cold cast iron floats upon fluid metal, because it has not become wetted by the fluid."

The fact is that the metal does not float until it has become wetted, for if a solid piece of cast iron is placed in a ladle containing liquid iron, it will sink and remain wholly immersed for some time and then rise to the surface.

*Read before the Engineers' Society of Western Pennsylvania, April 18.

Southern Bar Iron Men Meet.

A meeting of bar iron manufacturers was held at Louisville, Ky., April 18, the object being to bring Southern mills in harmony with the objects of the Merchant Bar Iron Association recently formed at Cleveland. Major Collins, of the Central Iron & Steel Co., Brazil, Ind.; Geo. W. Ristine, Chicago, general manager of the United States Car Co., Anniston, Ala.; Geo. M. Bard, Indiana Iron Co., Muncie, Ind.; Otis A. Brown, president of the Knoxville Iron Co., Knoxville, Tenn.; J. G. Caldwell, Louisville, president of the Birmingham (Ala.) Rolling Mill Co., and others were present.

It is reported that as the result of the meeting, Southern mills have advanced their prices and are refusing orders at the rates ruling in the past few weeks. One mill in the South, it is stated, has refused a contract for several thousand tons. The price offered was above that of early April, but was not up to the minimum fixed in the agreement.

THE Atlas Engine Works, Indianapolis, are now owned entirely by Hugh Hanna, who bought out his partners, Charles and Jesse Fletcher the past week, paying $300,000 for their one-half interest.

WESTERN FOUNDRYMEN'S ASSOCIATION.

The regular monthly meeting of the Western Foundrymen's Association was held Wednesday evening, April 17, 1895, at the Great Northern Hotel, Chicago, Mr. Geo. M. Sargent, the President, in the chair.

Those present were the following: George M. Sargent, the Sargent Co.; O. T. Stantial, Illinois Malleable Iron Co.; James Frake; H. L. Hotchkiss, J. L. Hecht, Deering Harvester Co.; A. Sorge, Jr., Fraser & Chalmers; John M. Sweeney; Jas. Fyfe, Pickands, Brown & Co.; C. E. Louis, Forster, Hawes & Co.; W. W. Messinger, Western Electric Co.; G. D. Chamberlain; H. S. Vrooman, Garden City Sand Co.; C. T. Bayless, J. Wendell Cole; F. W. Sargent Co.; S. T. Johnston, Whiting Foundry Equipment Co., all of Chicago; and C. A. Sercomb Schwab & Sercomb, Milwaukee, Wis.; W. N. Moore, Joliet Stove Works, Joliet, Ill.; Frank C. Patten, A. N. Wheeler, Frank C. Patten Co., Sycamore, Ill.; Herbert M. Ramp, Crescent Iron Works, Springfield, Mo.; A. D. Edwards, Illinois Iron & Bolt Co., Carpentersville, Ill.; A. W. McArthur, Rockford Foundry Co., Rockford, Ill.; F. M. Lyon, Burlington Route Foundry, Aurora, Ill.; R. F. Palmer, *Industrial World*, Chicago, and B. M. Gardner, *The Iron Trade Review*, Chicago.

The secretary read the following report of the committee on nominations:

"To the Western Foundrymen's Association:

"GENTLEMEN: A meeting of the nominating committee, appointed by the president to present names for the offices to be filled at the annual election to be held at the May meeting was called for 4 P. M., April 17. As only one of the members of the said committee was present there was no quorum and consequently, no meeting was held. The other two members of the committee, Mr. A. M. Thompson and Mr. Jas. Frake, found it impossible to be present. Respectfully,

"H. L. Hotchkiss."

It was moved and carried that the committee be discharged and that the chair appoint a new committee to consist of five members to present nominations to the meeting.

The following gentlemen were appointed by the chair as the nominating committee: C. A. Sercomb, O. T. Stantial, W. N. Moore, James Frake and H. L. Hotchkiss.

The secretary presented the following applications for membership, and the applicants were unanimously elected members of the association:

Gilson Mfg. Co., Port Washington, Wis.; Western Malleable & Gray Iron Co., Port Washington, Wis.; G. D. Chamberlin, chemist, South Chicago; and Frank C. Patton Co., Sycamore, Ill.

Prelude.

The president suggested that in the absence of the nominating committee any questions might be asked and discussed by the members.

Mr. Vrooman: A foundryman said to me a short time ago: "I would like to have you ask the Association what makes iron chill?"

Mr. Sorge: I think the gentleman ought to define what he means.

Mr. Vrooman: He wants to know in what condition the iron must be to give the chill; and what is in the iron to do it?

Mr. Sweeney: I imagine the chill takes place in the changing condition of the molecular action. I think it was stated in an article I read recently that it was possible to bring a piece of iron to a red heat by hitting it with a hand-hammer. The theory advanced was that the agitation of the molecules which went to make up the iron, and the fact of their passing and changing positions, one against the other, changed the temperature of the bar. If that is true that should account for the chilling. If all the molecules change their positions, the sudden stopping of them by chilling in a rapid manner, will hold the molecules one against the other in different positions from that which they occupied before.

Mr. F. W. Sargent: It seems to me that the chilling in cast iron is very similar to the tempering of steel. If we cool the steel very slowly, or in other words anneal it by slow cooling the crystals have time to arrange themselves and the result is large crystals and large surfaces to these crystals. Rapid cooling, instead of making the large crystals, seems to mass them together making smaller crystals in intimate association with each other. My knowledge is based on steel rather than cast iron. The Coffin process which the Cambria Iron Co. uses in toughening axles is based on the idea that the combined carbon is in two different conditions—in the hardening state and in the toughening state. The treatment produces two different results. They take a high carbon steel which would give in the ordinary axle without treatment bad results. When cooled slowly it shows a very course structure, the combined carbon is supposed to be in the toughening state and the crystals are large and the faces of contact broad. The fracture takes place along the faces of these crystals; as when you break pig iron, No. 1, you get large crystals. Now in chilling steel by the Coffin process, they have the axle at a very high temperature and it is rolled down through running water, pretty cold, so that the heat is extracted very rapidly and the axle is taken out before the heat is wholly extracted. There are about 900° left. It drops from 2,500° to 900°. There is just enough heat left in it to make it a dull red. The combined carbon is the same after the treatment as before, but the fracture shows a very fine grain—very small crystals. The process of chilling is very similar to tempering steel. The sudden extraction of heat makes the molecular construction more dense, smaller crystals, and is due to the fact that the carbon is in the hardening state rather than the toughening state. Toughening by this process shows that by changing the chemical combination of steel you can change its physical properties very materially. I think the process of chilling is simply the sudden extraction of heat, the arrangement of the molecules in small crystals and the dissemination of the combined carbon throughout the mass in hardening carbon rather than the toughening carbon.

Mr. Sorge: The total amount of carbon in the iron is not varied at all by the chilling process. In iron, that is in the molten state, the carbon is held in solution, and I think the rapid chilling fixes it in that state. It is held in molten iron in a dissolved state and in the rapid chilling time is not given for it to separate into the graphitic state. As far as the comparison with steel is concerned, we have the small crystals in the hard iron and the large crystals in the soft. I think there are two systems of crystals. You will find in the chilled piece of iron the long interlaced crystals, and if you break the soft iron you will find the granular crystals. The granular appearance in the cast iron indicates a soft iron, an open iron, while the close firm crystals indicate the chilling property of the iron.

Mr. F. W. Sargent: What I was trying to get at was this. We take cast iron, for instance, and it is an aggregation of crystals with more or less graphitic carbon between them; and the lower the iron in number, the more graphitic carbon there is. In No. 1 iron it comes in little scales and that makes it easy to fracture. In regard to the crystallization of iron, you know the crystals are always at right angles. In hard iron you will find a crowd in the center and you will find more or less graphitic carbon in them. The sudden cooling sort of brushes it in there and does not allow it to get out, and instead of graphitic carbon it becomes combined carbon.

Mr. Sweeny: What is the effect of phosphorus on the chilling?

Mr. F. W. Sargent: It acts like carbon; it forms a layer between the crystals so that they will break along their cleavage faces. This Coffin process claims to be able to make a crystal break through its body instead of along its cleavage surface. It seems to me that the tendency of phosphorus is to make the metal cleave along the crystals. I think there is something else beside the carbon in chilling iron. I think the silicon has some influence. I am not posted enough to say.

Mr. Sweeney: The reason I asked the question about the phosphorus was in order to get some information. At one time I had some experience in making revolving chases for pulverizing iron over and also in the manufacture of fire brick. The strength was not wanted in the chilled rims which went on the outside of the chases, but merely hardness. We found that by using an iron high in phosphorus—I think three per cent—the rims being cast against a chill, and about four or five inches thick, we would get a flinty condition of the iron against the chill, and the rims wore three or four times as long as rims made out of good chilling iron which was used in car wheels.

Mr. Vrooman: It seems to me that iron will change after it has cooled. A chisel or drill is tempered by its color. A twist drill is tempered at a straw color. They are plunged in water and when the color has reached the point desired they get the chill they are after. It must be that a chemical change takes place after it has hardened as well as before.

Mr. Sargent: There is no change in it after it has chilled It is clearly evident there has been a physical change and that has been explained by the fact that the combined carbon is in two different states. It is the same thing under different conditions. It is simply the amount of heat extracted.

Mr. Sweeney: They do not temper the tool by the color; they temper the tool by the temperature and the temperature makes the color. If you temper it at a different temperature it will be a different color. The twist drill is chilled in the molten bath, that is why you see in twist drills that pronounced color. The color indicates the temperature and is the result of the temperature.

Mr. Sorge: It strikes me that there is another thing. Let us assume that we have two irons of the same chemical composition. One will chill and the other will not. Why is it?

Mr. Chamberlin: I am inclined to think that in the low silicon iron you will get the chill. The less the silicon the quicker it will chill. High silicon iron will not chill at all.

Mr. Sargent: The more silicon you have in the iron the softer it is.

Mr. Sorge: There is something in the physical properties of the iron itself. The difference between combined and firaphitic carbon is that one is insoluble and the other soluble.

The nominating committee presented the following list of names to be voted on at the next meeting:

President, John M. Sweeney, W. N. Moore, C. A. Sercomb.

Vice-president, H. L. Hotchkiss, John M. Sweeney, A. W. McArthur.

Secretary, B. M. Gardner, H. S. Vrooman, S. T. Johnston.

Treasurer, O. T. Stantial, A. M. Thompson, L. Wolf, Jr.

Executive Committee: Geo. M. Sargent, John M. Sweeney, O. T. Stantial, A. M. Thompson, W. Francis, E. H. Walker, John T. Rowlands, A. W. McArthur, J. H. Dalton, M. N. McLaren, L. Wolff, Jr., F. W. Sargent, A. D. Edwards, C. A. Sercomb, J. L. Hecht.

The secretary read the following paper:

Future Improvements in Foundry Work.

BY HERBERT M. RAMP.

I have been requested to write on this subject, and while we are all grasping for and trying to attain better methods, I feel it is almost beyond my power to speak of the lines on which future improvements will be made, with the clearness possible to older men having the advantage of larger experience by which to measure the future. The improvements of the future will be the measure of our mechanical and financial success; the means by which we retrieve past mistakes and add to our prosperity. They include the methods we will adopt to overcome past difficulties; the measure that will be taken to reduce cost of production, and the appliances that will be necessary to accomplish the end desired.

No one will question that our improvement in rapid and economical work will be marked to a decided degree in the next decade. In the first place, foundries of the future will confine themselves more exclusively to one class of work. The jobbing shop, and others that try to cater to every grade, that attempt to make everything from marine engines down to a door-lock, will be things of the past, or exist in greatly diminished numbers. Foundrymen will turn their attention to producing one particular grade of work at the lowest possible cost, and the less varied the work, the greater the possibilities of cheap production. The man who turns all his energy and study to one thing will surely meet with greater success than he who simply gives it casual attention every three months or every year, as the case often is in our general foundries.

Appliances will be made in each individual shop, to suit the different classes of work, and the rigging thus constructed will require brains, money, and especially a thorough understanding of and every-day contact with the work in question. Firms will understand the wants and requirements of their business better when they have only a certain grade to look after. The men employed, from foreman down to the common laborer, will understand their work better, and be able to accomplish more, through constant repetition. Molders will make fewer bad castings, as the new system will not require a constant series of experiments on new and strange work.

To-day we have stove, agricultural, bench, railroad, architectural, and other classes of foundries, that make nothing beyond a single line of work, but they have not yet reached the point where they have no competition from foundries engaged in general work. It will be folly for a shop building engines to attempt to take an architectural contract, or *vice versa*, when we consider that one has the most experienced men and most improved methods in its particular line. The shop that makes dry sand loam, or any specialty will make the same without fear of competition except from those engaged in the manufacture of the same articles. The experience and practical, every-day observation will give to the specialist the opportunities others lack.

This will mean better equipped foundries, better appliances. The buildings will be constructed to suit the special grade of work. There will not be so wide a field of supposition. When cranes are used, they will be large and strong enough to do the work. The machines, cupolas, core-ovens and other rigging will be built to suit the product. The pig iron, blackings, sand, and all the other details will be purchased according to their adaptations, and all elements reduced to a scientific basis. To-day we have hundreds of shops where the work is too large or too heavy to handle with economy. A foundry was built and fitted up according to some other shop's standard. The proprietor believed it was large enough, and the equipment strong enough to do any grade of work he might obtain; yet in a short time he finds it utterly inadequate to perform the necessary work, and the result is always increased cost of production. With improved methods such practice must cease. The man who builds a foundry will first understand his business, and have one class of work definitely in view. Foundry improvements grow more expensive every year, and will continue to do so. This is an argument in favor of the still further division of our foundries. The time when a cupola, blower, and a few sand piles constituted an equipment has well nigh passed away, and the increased expense of machinery, patterns and fixtures will not only assist in driving firms to specialties, but protect them when once started in business.

There is one deplorable condition in our business. It has not been given careful study. Complete records have not been kept nor have operations in any manner been reduced to a scientific standard. The machinist has his text-books, rules and tables, all based on experiment and the experience of practical men. Yet, excepting the records and research embodied in permanent form by three or four men, our foundry practice has been tradition handed down from father to son, and often embodying practice that is absurd.

We should and will develop more in this line. Such organizations as our foundrymen's asssociations and such trade journals as we have, are giving us a means of collecting information. Accurate records of our daily work should be kept, and every mixture of iron and its result carefully noted. Mr. Keep has done a great work in this direction and its influence is felt in many of our foundries to-day.

The amount and kind of iron melted, fuel and blast pressure used, and in fact all the details of our every day work, should receive systematic attention and the monthly or yearly results made known. We have no set of tables for computing the strain on flasks, clamps and various other rigging used daily varied by the different heights of gates, except by processes rather tedious for a busy man. Still less do we know the actual strength of our fixtures. It is too often a matter of conjecture and supposition. We have no rules for shrinkage of castings, or what size risers it requires to feed bodies of certain thickness, only by a sense of fitness or judgment. Contraction we are compelled to learn in order to make work at all acceptable, and why shall we not in a more scientific manner master these problems? Where do we find information as to the size of lumber to use in flasks of different lengths, from 10 to 25 feet long, or the thickness and construction of iron flasks according to size and intended use? Molders have very little data to work from. We have articles and discussions on steel and mechanics and in numerous other fields, but where is the authority that treats molding

sand in a practical manner, and gives information upon the necessary constituents of such sand, its qualities and treatment in different localities, on different work? There are some who do not require such assistance from others in their work, but they are men who have mastered the business thoroughly and their number is easily counted.

Yet how much farther they might have been advanced if they had authorities that pointed out to them many things that were learned by trying experience. One great trouble with foundrymen as a class is, they study effect, not cause. Certain practice brings certain results, this they know; but the underlying cause is never mastered. Too much valuable knowledge and information dies with each generation; the experience and study of a life-time too often is lost to us, except a few fixtures or ideas we have remembered. The future foundryman will have more classified information than the one of to-day. Text-books will become as common in the foundry as in other mechanical lines; the results of our work will be more carefully kept, and together with these opportunities of interchange of experience, will form material for authorities that, while they will not be infallible, will be of incalculable assistance. Chemistry will become not only an aid but a necessity, and will be applied in a practical manner by practical men. Bad work will be reduced to a minimum by such practice, to-day the bad castings that are made annually in this country would pay a good rate of interest on all the money invested in foundries. This will seem a broad assertion, but a little self-examination will convince the most skeptical.

Molding machines will play a prominent part in our improvements. We have on the market a number of machines at present, good, bad, or indifferent, but the best are rather expensive and firms hesitate to invest. This condition will pass away. No matter if a machine cost $50,000, if it is a sure means of reducing cost of production, the investment will be made cheerfully, and the more expensive the machine, the better it will protect from competition the firm that buys it. Our machines will also be constructed for more rapid and economical work, will be more nearly automatic, and in some cases entirely so. They will be built in more sizes and shapes. One machine is not capable of being adapted to every class of work, economically, any more than a machinist can cut thumb screws to an advantage on a 48″ lathe. Our machine shops are examples of what our foundries will be in this regard; their machinery is built for every class of work, and almost every size. Machines will also be built in some cases to suit a greater variety of work, so common patterns of almost any shape or design can be used, at very little extra cost of rigging, but in specialties they will be built to suit the exact grade of work, and in many cases the identical casting.

Core-rooms and core-ovens are often a very expensive feature in our work, and the reason is plain. The men who control or work in them, like the molders, have little information, except what they acquire by experience and hard knocks and have even less assistance in improved facilities. Machinery has been a rare thing here, but with the advent of air in our foundries and stimulated enterprise, there is no question but machines will be constructed that will reduce cost to a great extent. The mixing of core sand in foundries that use many large cores, is an item of great expense, more so than we would believe. The time consumed is something appalling, and here is room for decided improvement. Mills or mixers can be built to do the work, operated by power, mixing the sand and flour, riddling the same, and preparing it for immediate use, with one handling. Joining cores is another expensive operation, but many of our foundrymen to-day are resorting to the plan of making cores solid, and have plates of the requisite shape to dry them on. Bumpers, oil-boxes, round column cores and numbers of others are handled in this way now; but the field for the expansion of such facilities is large and will be sure. Besides saving time in joining, cores made in this way are stronger and nearer to the exact size desired; also one whole core can be made quicker than two halves. Core boxes and plates will be made with as much care and skill as our patterns and flasks, and more study and attention will be devoted to this part of our business. The handling of molding sand has always been a laborious and expensive item in foundry work. Twenty-five to 30 cents an hour is high wages to pay for shoveling sand, yet thousands of molders are doing it daily, and at the expense of decreased production. Conveyors can be arranged to carry the sand overhead, which process will temper it, where it will be within easy reach of the molders by movable hoppers. Such practice is now used on our molding machines, and is adaptable to all classes of work, where large quantities of sand are handled. Only those conversant with the business in a practical way realize how much time and labor is consumed in this manner. Suppose a molder is making work that is plain. Shoveling and ramming are nine-tenths of the work, and by such rigging he fills his flask in an instant without labor. Or, suppose his flask is six feet square, and takes a couple of yards to fill it, and this can be done in a minute, what will be the result in time saved?

Facilities for handling work are probably as far behind the times as anything else. Cranes are too few and far between, often too light for heavy work, and nearly always too heavy for light work, and always expected to accommodate more floors than they are capable of serving. Any casting a molder can make on a side floor is made there and the labor of handling remains on the men. Our light work is not given proper facilities for handling.

Compressed air and the overhead trolley system, are becoming mighty factors in our foundry practice, and are especially adapted for the work. Air machines and hoists are rapidly gaining in favor, and their advent in shops that pretend to compete is but a question of time. The over-head trolley system with air hoists for handling flasks, iron and castings will follow soon. The flask-yard, core room, cleaning room, molding room, and all places in which lifting power is necessary should be fitted with this arrangement, and the heavy labor of to-day made rapid and easy. Molders or any other men around a plant will gladly do more work, if the heavy labor is taken off from them. There is no possible limit in sight to the utility of these improvements. No matter if it is possible for men to handle certain flasks or castings, carry and pour their iron by hand, a reduction in heavy labor means an increase in production. Another advantage of this system is that every molder can be supplied with a trolley and hoist at a low cost, and he can have his own individual crane. How much time is lost in foundries, waiting for the cranes, and changing hoisting apparatus, no one but the initiated know.

Stand in the door of a shop, and watch the time it takes for men to get a lift when five or six hands are required. Note how many minutes of each man's time is lost and multiply the same by the possible number of lifts required in a day; the result will be astonishing. Watch one man lower his cope on horses ten minutes before he is ready to close, in order to keep some other molder from waiting on the crane, then having to change and adjust his slings or beam all over again, and possibly wait himself a few minutes. This is a faithful picture of many shops.

When we have air pressure it will be attended with many economical developments. Our iron and fuel can be raised to the scaffold with it, elevators run, and numberless other labor-saving devices made possible.

In cupola practice there will be a decided reformation. The greater number of our shops to-day, melt at an average ratio of fuel to iron of one to seven, up to one to nine, occasionally one to ten, and in rare cases one to 13. Our loss in this direction is enormous. We know the heat lost by radiation and passing up the stack is more than sufficient to melt the iron charged; we also know we do not get the service or speed from our cupolas that is possible. The form of our cupolas and tuyere arrangements must be altered to reduce the immense amount of fuel used in bedding, and means adopted to overcome loss through passing up the stack. One to 20 may seem an ideal of economical melting, but I am confident it will be accomplished in a few years. The heat is there; the problem is to utilize it. Dull iron, bunged cupolas, and late heats will be rare occurrences, and our practice reduced to a scientific basis.

I do not assume in the foregoing, that any of these things will be executed in the exact details I have mentioned, any farther than at present. But future improvements must embrace the items that are most expensive and laborious in our business, and from my observation, they are as already shown. Authorities to refer to, divisions of classes of work, improved

machines, better rigging for making cores, and facilities for handling sand, and everything that requires lifting power—these are all items on which it appears much labor is wasted, and on which our future has abundant room for progress. I might name numerous other details in flasks and other rigging that require and will receive improvement, but their growth will be sure and keep pace with other parts of the business.

I do not know that there is much that is new in what I have said, but my object has been to attract attention to those things wherein our greatest possibilities for improvements lie. I do not say how soon these things will be realized. In some, I may be slow; in some too soon; but I do not wish to be regarded as visionary or impractical in my expectations of our future. Neither have I any desire to belittle or condemn our present practice or the efforts of those interested.

A unanimous vote of thanks was tendered Mr. Ramp for his interesting paper.

Discussion.

Mr. Johnston: I would like to corroborate some remarks in regard to compressed air hoists. You are aware that the company with whom I am, make these quite extensively. There is a great demand for them. You would be surprised to see our mail. We have four or five inquiries a day. As I go around the country and see the foundrymen, I learn right along that they are taking great interest in the compressed air hoist business.

Mr. Stantial: I am in one of those shops that get a little of everything. I only wish we might confine ourselves to one product. I think life would be a little more comfortable and enjoyable.

Mr. Moore: The paper that has been read is one that interests me, as it bears upon the cupola. That of course interests all of us. I am inclined to be quite as sanguine as the writer in believing that we will most of us see the time when we shall use not more than one pound of fuel to 15 or 20 pounds of iron; and that is an important matter. I believe it because the heat is there and sooner or later the great waste of material which we are making must be overcome and there will be some one bright enough to devise means for saving the fuel. I believe where cupolas are kept in operation for a number of hours or a good share of the day that we have something to learn from the blast furnace practice and that there is some adaptation of it to cupolas which will come in the course of time—that is by using the waste gasses and heat that comes off from the top of the stack. The problem is solved in blast furnaces and I believe that some day we will see it applied to cupolas.

There is also one other improvement which I think it is well for us as foundrymen to keep in mind, and that is the development of electricity as applied to the melting of iron. There are chances in that direction which are well worth keeping track of. The thing has been done. I don't know whether it has been done in a commercial way or not, I rather think not. A paper appeared in one of the trade journals giving an account of the experiments or operation of the system in Germany. The means employed were somewhat the same as those employed for the reduction of aluminum. The metal was put into a bath, through which a strong electrical current was passed, and was reduced and run off as it was wanted. I think we all want to watch the thing very closely.

Mr. Cole: I was speaking yesterday with Mr. Shaw, who is foreman of the Allis foundry in Milwaukee, and who has taken out two patents for electrical melting, one of which he read to me yesterday. This shows that right here in this country and near Chicago the matter is receiving close attention at the present time.

Mr. Sorge: At the present time it is out of the question on account of the cost of electricity. I do not believe our improvements in melting will be in the direction of using electricity, but will be more in the direction of economizing. I believe we ought to study the methods employed in the Bessemer steel process.

Mr. Johnston: They are melting at Muncie, Ind., with gas.

Mr. F. W. Sargent: It seems to me that the open hearth system might do very well in melting pig iron. There is little loss of heat there. You could burn out elements that you are in doubt about and doctor the bath with what you do want in.

Mr. Ramp: As regards the melting: I did not wish to put in a great long story about what I had done and how I did it; but when I said 1 to 20 I was not very far off in one sense from the practice I do now. In melting iron that is composed of from 40 per cent to 50 per cent of pig iron and the remainder of railroad scrap, which is heavy scrap, after the bed I charge 2,500 pounds and I use 125 pounds of fuel. When I come to all railroad scrap I use 100 pounds of fuel between the charge, that would be 1 to 25. In all reports and papers that I have ever seen written on melting iron there has been one fact that has been neglected and that is that the different irons require more, or less fuel. If I was melting all pig iron I could not melt the 2,500 pounds under 140 pounds of fuel. If we could only do away with the immense bed. There is a problem for the foundrymen of to-day. I have run the furnace for three hours on the above basis and it was as clean as if I had only run three-quarters of an hour. The less fuel I use the freer and cleaner the furnace is.

Mr. Sercomb: What struck me very favorably in the paper was the matter of specialties in practice. Nobody can be in the swim with a man that is fully equipped in the manufacture of specialties. I cannot see how you are going to save the heat. I think it will be an utter impossibility to do away with the bed. We will have to continue on in the same way for a long while. I know when I have to heat I must use fuel.

Mr. F. W. Sargent: The paper of this evening was full of suggestions, it seems to me. The most pertinent idea seemed to be the possibilities in the way of handling sand by means of conveyors, taking the labor away from the molder and taking the sand away from the floor entirely by means of overhead conveyors. That is especially applicable to molding machines. I want to have the sand above the machine. I think that is one of the best suggestions. The same may be said of the sand in the core room. There is too much labor and too much room taken right among the workmen by these piles of sand which have to be shoveled and moved around.

Mr. Ramp: I have no system for moving sand. That idea came to me from what I saw at Burlington, Ia. They have a large pneumatic machine there with an overhead trolley and air hoist.

The meeting then adjourned.

Siemens-Halske Co.'s Important Move.

A deal is about to be consummated at Chicago, involving the purchase by the Siemens-Halske Electric Co. of the plant of the Grant Locomotive Works, in the town of Cicero, and the employment of 1,500 skilled employes. When the Grant Locomotive Works assigned the Siemens-Halske Co. leased the property and has occupied it since. The sale will undoubtedly be closed before the termination of the present lease. There is a mortgage of $217,000 at seven per cent. This will be assumed by the electric company and refunded at five per cent. The Siemens-Halske Co. has now a capital stock of $1,000,000, of which $775,000 is paid in. To carry out the purchase deal the capilal stock will be increased to $2,000,000, $700,000 of which will be preferred, and $1,300,000 common stock.

The Seimens-Halske Co. in its factories at Berlin, St. Petersburg, and Vienna employs 30,000 men. In the factory of the American company at Chicago, 500 men are now employed on full time. As soon as possession by purchase is secured of the leased works, 1,500 more men will be put to work, and generators of all the types manufactured in Europe will be placed upon the market. Besides putting in the necessary additional machinery, the Siemens-Halske Co. has determined to utilize the expensive machinery of the Grant Locomotive Works. The 23 locomotives nearly completed at the time of the assignment will be finished up and put upon the market. Officers of the Siemens-Halske American Co. are also owners of the Wells & French Car Co., which is working now upon a single contract of 800 cars for P. D. Armour. The electric company, through the Wells & French Co., is so closely related with the railroad interests of the country, that it is believed the manufacture of locomotives commenced by the Grant Locomotive Co., can be continued.

INDUSTRIAL SUMMARY.

New Buyers in the Market, and Some of Their Wants:—

[If you are in need of machinery of any description, please notify *The Iron Trade Review* and we will put you in communication with our advertisers at once.]

John Davis and James Ingoldsby have started a foundry at Council Bluffs, Iowa.

The Ohio River Sheet & Tin Plate Co., of Pittsburg, has made application for a charter.

The Brown & Lipe Gear Co., of Syracuse, N. Y., has been incorporated to make a patent gear.

G. W. Rutherford has purchased and will operate the Piedmont, (W. Va.) Foundry & Machine Co.'s plant.

The Zindorf Construction Co., of Seattle Wash., has incorporated with $70,000, to construct railways, bridges, etc.

L. Kiper & Sons, 3 to 17 E. Huron st., Chicago, want a second-hand engine, 75 to 100 horse power, Corliss preferred.

The Weldless Steel Tube Co., Pittsburg, Pa., with a capital stock of $250,000, has incorporated. The new concern will manufacture weldless tubing, and coat the same with copper or other non-corrosive metal.

The Columbia Architectural Iron Works, of Greenburg, N. Y., were incorporated at Albany, with a capital of $50,000. Directors are Wm. F. Froeligh and Louis Froeligh, of Brooklyn, and Henry H. Royce, of Cranford, N. J.

The firm of Samuel Trethewey & Co., Ltd., has been organized at Pittsburg, Pa., and will manufacture rotary, straight and angle solid steel shear knives from crucible steel. The firm will also make hardened forged steel rolls, roll turning tools, steel specialties, etc. Samuel Trethewey is chairman and Uriah Tinker, secretary.

E. Bradley, who is connected with the financial department of George B. Carpenter & Co., of Chicago, and W. W. Messinger, formerly foreman of the foundry of the Western Electric Co., have formed a partnership for the manufacture of brass castings of all kinds, and to run a job brass finishing shop. The concern will be located at 39 and 41 W. Washington st., Chicago.

New Construction:—

The Morse, Trussell & McLoon Machine Co., of Rockland, Me., will build an addition.

M. C. Reddin, who has a foundry at Jordan, N. Y., will build another at Syracuse, N. Y.

The Barr Pumping Engine Co. will erect a shop near Germantown Junction, Philadelphia. The building will be of brick, one story high 57x97 ft.

Work has been begun on the foundations for the new tin plate plant at Remington station, near Conway, Pa.

The H. N. Strait Mfg. Co., of Kansas City, Mo., will soon begin the erection of a brick foundry 80x100 feet replacing a burned building.

The White & Middleton Gas Engine Co., of Baltimore, Md., will erect a new two-story factory 80x120 feet. Considerable new machinery will be put in.

The Hill Foundry & Machine Co., Anderson, Ind., will begin work May 1 on the erection of new foundry buildings. They will be of brick, and two stories.

E. E. Erikson, of Pittsburg, Pa., is drawing up plans for the large heating furnace for the Pioneer Rerolling Rail Co., of Chicago, Ill. The furnace will be 35 feet long, 10 feet wide, to be fired with coal.

A new power house to cost $10,000 is under way at the Pittsburg Locomotive & Car Works, with other improvements that will increase capacity. An order for 12 engines for the Georgetown & Trinity road, now under construction in Texas has been received at these works.

R. S. Newbold & Son Co., Norristown, Pa., manufacturers of rolling mill and blast furnace machinery, rock crushers, etc., will erect a new 104x75-foot machine shop and a 21x75-foot cleaning room will be added to the foundry building and a number of machine tools installed. A 50 horse power electric generator and three motors aggregating 35 horse power will also be introduced for distributing the power and supplying current to 250 incandescent lamps.

Additions, Enlargements, Removals, Etc.:—

The Midland Steel Co., Muncie, Ind., purposes erecting two 3-ton Bessemer converters.

Two additional mills are being put into the Morewood Tin Plate Works, at Gas City, Ind.

The Bethlehem Iron Co., is remodeling its old rail mill for manufacturing deck beams, I beams and channels, also the present rail mill, and is building an armor plate mill.

The Cleveland Punch & Shear Works Co., of Cleveland, O., has decided to erect an addition to its works. The new building will be 60 feet wide and 90 feet long, three stories high.

The Quast Gas & Gasoline Engine Co., Bucyrus, O., which is just getting under way at Bucyrus, O., with orders for 100 engines on its books, has begun the erection of an addition to the plant which it took ready built. It will be 60x165 and will give place to 50 more men.

The axe works operated by Romer Bros., Gowanda, N. Y. will remove to Dunkirk, N. Y. Dunkirk will furnish a site near a railway and build a switch, besides paying the expenses of moving. Romer Bros. will erect and equip the new plant independently. They take with them between 50 and 70 skilled workmen.

The Cleveland Twist Drill Co., of Cleveland, O., has just completed the large addition to its factory, 110x40 feet, consisting of three floors and a basement referred to some time ago in these columns. The company is bringing out a new grip socket for twist drills, the invention of Jacob D. Cox, Jr. It is said to be the first improvement in twist drills made in many years.

Fires and Accidents:—

The Nebraska Iron Works, Lincoln, Neb., were destroyed by fire recently.

The foundry of the New Doty Mfg. Co., at Janesville, Wis., has been burned.

The steel crane at the Shenango Valley Steel Mill broke April 12. The ladle was full of metal, but no one was injured.

An explosion of metal as it was being poured at the Sharon (Pa.) Steel Casting Co.'s Works, April 20, showered the molten steel upon eight workmen, all of whom were terribly burned.

At the Chicago Shipbuilding Co.'s yards at South Chicago, April 20, the hoisting machinery collapsed and several beams used in the construction of the steamer Arcadia fell, killing three men and injuring six.

General Industrial Notes:—

It is reported that Rising Fawn Furnace, Dade Co., Ga., will soon blow in.

The Latrobe Steel Works, Latrobe, Pa., is operating double turn. Two new furnaces are to be built.

No. 2 furnace of the Lackawanna Steel & Iron Co., at Lebanon, Pa., has blown in after being remodeled.

Furnace C of the Edgar Thomson blast furnaces at Bessemer, Pa., has blown in after three months of repairs.

The Pennsylvania Steel Co., at Steelton, Pa., has contracted to put in a Harvey furnace, to Harveyize steel castings for crusher jaws.

The Bessemer department of the American Steel Casting Co.'s plant at Alliance, O., has started up after an idleness of several months.

The Connelly Gas Engine Works, New Castle, Pa., have been busy on orders for engines of about 25-horse power, for use in the oil regions for pumping wells.

Chas. Kaestner & Co., manufacturers of machinery, whose factory at 249 S. Jefferson st., Chicago, burned in March, are now located at 162 and 164 W. Van Buren st.

The Linden Steel Co., of Pittsburg, has started up one of its open hearth furnaces and are now making open hearth billets for its own use, and also for the general market.

At Warren, O., work was begun April 22 on the idle puddling furnaces at the Warren rolling mill, preparatory to starting them. Only a part of the mill has been in operation.

In one turn of 10 hours there was produced at the rod mill of the Oliver Wire Co., Pittsburg, recently, 396,100 pounds of No. 5 rods, claimed to be the largest 10 hour record made.

The Norton furnace, at Ashland, Ky., will go in blast soon and will be operated by the Ashland Coal & Iron Railway Co. which has leased it. Fourteen new boilers are being put in.

The entire plant of the Brown-Bonnell Iron Co., at Youngstown, O., is in operation this week with the exception of No. 2 puddle mill and the Williams guide mill. Over $32,000 was

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LIGHTNING LIFTING SCREWS. TAPER THREAD.

distributed among the employes of the company on the last pay day, April 20.

The Vesuvius Iron Works of Moorhead Bros., at Sharpsburg, Pa., are experimenting with heavy skelp for eight-inch tubing. A large order hinges on the success of the experiments.

The Atlantic Works, New Castle, have been closed down for two or three weeks, and are putting in new spur wheels and other improvements. The puddling department is ready to start.

At Milwaukee, Judge Jenkins has entered a decree in U. S. Court ordering the sale of the plant of the Racine Hardware Mfg. Co., at Racine, to satisfy claims, with costs, amounting to $131,708.02.

The new steel works of King, Gilbert & Warner in the Southern part of Columbus, O., will be making steel soon after May 1. Most of the men employed will come from Pomeroy, O.

Merrill Bros., of Brooklyn, N. Y., are now using mild stee instead of iron for the buckle part of their turnbuckle, and use but one piece. They find that the new buckle bears a much greater strain.

The rod mill of the New Castle Wire Nail Co., New Castle, Pa., averages from 100 to 110 tons of No. 5 rods in a 10-hour turn. The new engine will make it one of the best equipped mills in the country.

One of the largest electric traveling cranes in the county has been built at the foundry of Mackintosh, Hemphill & Co., of Pittsburg. It weighs 72,000 pounds, has a 49 foot span with a lift to the line of the rails of 29 feet.

J. W. Adams, of Allentown, Pa., and other capitalists are negotiating for the purchase of the Cole blast furnaces at Sheffield, Ala., also of the Gamble coal mines near Jasper, Ala., and a plant of 300 coke ovens. The sale will involve $350,000.

The Morgan Engineering Co., of Alliance, O., has shipped six car loads of machinery to the steel works at Homestead. The consignment consisted of four overhead traveling cranes, one of which is the largest ever manufactured by the Morgans.

Sharon, Pa., citizens have subscribed a guaranty fund of $4,650 to make up to the workmen the 20 per cent in wages which is to be retained by the Kimberly mill. In case the business warrants it, the mill will eventually pay the full amount to the men.

The Ætna-Standard Iron & Steel Co., of Bridgeport, O., has brought suit at Columbus, O., against the Secretary of State to test the levying of a tax in Ohio on the stock of a foreign corporation. The Ætna-Standard Co. is incorporated under the laws of West Virginia.

Captain James Davidson, of Bay City, Mich., who has built many wooden vessels, will add a plant for the construction of iron and steel ships to his present yard. He will have facilities for bui'ding four boats at a time. The steel shipyard will be ready for business by Sept. 1.

At the rod mill of the New Castle, (Pa.) Wire Nail Co., the great engine built by the Bass Foundry & Machine Co., Ft. Wayne, Ind., is being installed. The castings are very heavy and a special track has been laid for the purpose of getting them into the engine house.

Julian Kennedy, of Pittsburg, is interested with Harry Hamilton and others of Youngstown, in the steel and blast furnace plant to be built at Kingston, Ont, under a bonus from the city which the projectors are to pay back with the Dominion Government bounties on the production of iron.

It is reported that Frank Eagle, of Chicago, has made a proposition to the Brown-Bonnell Iron Co., of Youngstown, O., to lease the Struthers furnace, but no terms have been concluded and the statement is made that the present owners may want to operate it should the condition of business warrant.

A visit of inspection was made to Sparrow's Point, April 19, by the reorganization committee of the Maryland and Pennsylvania steel companies. The visitors were accompanied by Major Luther S. Bent, president of the Pennsylvania Steel Co. On the following day the plant at Steelton, Pa., was inspected.

The Whiting Foundry Equipment Co., 1522 Monadnock Block, Chicago, with works at Harvey, Ill., has recently sold one of its No. 7 Whiting cupolas to the Indianapolis Foundry Co., of Indianapolis, Ind. This cupola is put in in addition to the foundry plant of the Indianapolis Co., doubling its capacity.

The explosion doors put on Rosena furnace at New Castle, Pa., have been tested by a slight slip that occurred a short time ago. The doors were cut near the top of the down-corner and a cage built about it at that point. It is the hope that these doors will permit ready vent in case of slips, thus avoiding the blowing out of the bell.

The Buffalo Engine Works, of Buffalo, is a new concern, composed of several well-known mechanics of that city, who will engage in the manufacture of marine and stationary

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engines and other specialties. They have contracted with the Lodge & Davis Machine Tool Co., of Cincinnati, for the entire equipment of their plant, including several large lathes, planers, drill presses and shapers.

The entire property of the Alabama Iron & Railway Co., of Sheffield, Ala., including three furnaces, with a daily capacity of 500 tons of pig iron, 70,000 acres of mineral lands, and in addition to this, some large tracts of coal land and a coking plant have been purchased by Pennsylvania people. The furnaces, which have been idle since shortly after their construction in 1889, will, it is said, be immediately put into operation and the entire property worked on a large scale. The new company will be known as the Sheffield Coal, Iron & Steel Co. The original cost of this property was over $1,500,000.

At Grand Rapids, Mich., suit was begun in U. S. Court April 19, by the Michigan Trust Co. against the Hatch Cutlery Co., to foreclose a trust mortgage for $75,000 given by the Hatch Cutlery Co., incorporated under the laws of Wisconsin, and owning a plant at Buchanan, Mich. The mortgage was given in 1894 to secure payment of 150 bonds of $500 each, payable after four and before seven years, with seven per cent interest to be paid semi-annually. The cutlery company has failed to meet the first payment of interest. The Hatch Cutlery Co., after receiving a bonus from South Milwaukee to locate there, suddenly removed last summer to Buchanan.

The annual meeting of the stockholders of the Joseph Dixon Crucible Co., Jersey City, N. Y., was held April 15. The detailed statement showing the millions of lead pencils, cakes of stove polish, crucibles, etc., manufactured, met the approval of stockholders present, which manifested itself by the unanimous re-election of the following directors and officers: Directors—E. F. C. Young, John A. Walker, Daniel T. Hoag, Richard Butler, William Murray, Alex. T. McGill, Jerome D. Gillett. Officers—E. F. C. Young, president; John A. Walker, vice president and treasurer; Geo. E. Long, secretary. The Joseph Dixon Crucible Co., established in 1827, has the most extensive manufactory of graphite products in the world. These comprise plumbago, crucibles, graphite facings, retorts and other goods used in foundries and smelting works; lubricating graphite, graphite greases, graphite paints and Dixon's celebrated American Graphite Pencils, and carburet of iron stove polish. These goods meet ready sales in all the cities and towns of the United States and find their way into all parts of the civilized world.

BEFORE purchasing your tickets, first ascertain the rate via the Nickel Plate Road.

Coke Production Falling Off.

Connellsville coke production in the week ending April 13 was estimated by the *Courier* at 140,489 tons, a falling off of 18,017 tons from the week previous. Shipments were 6,586 cars, a decrease of 1,817 cars. The active list was cut down by 650 ovens and further reductions are looked for. The higher price has been followed by an accumulation of coke in the hands of the operators. Full shipments are still being made to some furnaces on low priced contracts and there are new sales at less than the circular price. The operators intimate, however, that at the end of the second quarter, a further advance, possibly to $1.50, is likely to go into effect.

WITH the issue just put out, the *New Science Review*, Trans-Atlantic Publishing Co., New York, publishers, ends its first year. It has won a place as a foremost exponent of popular science, by the high standard of its contributions and by the discriminating choice of the subjects treated. William George Jordan, whose paper on "Mental Training, a Substitute for Education," in the October *Review*, attracted such widespread attention, contributes to this number a paper on the cognate subject "Genius: the Model for Educational Methods." Maggie Symington gives an entertaining sketch, "Where the Steamboat Was Born;" and a subject with which the public is little familiar, is lucidly treated in "The Ether, and Its Functions," by Prof. George Fraser Fitzgerald, of Trinity College, Dublin. The paper given first place is on "The Elements," the writer being William Crookes, most distinguished of living chemists. "Autobiographical Notes" by Richard A. Proctor are given to the public through his daughter, Miss Mary Proctor.

IN "Effacing the Frontier," May *Lippincott's*, William Trowbridge Larned casts a good deal of light on the condition and prospects of the West. Our army, he thinks, will soon be no longer needed to keep the red men in order, and may profitably be stationed in Chicago and other cities to meet the growing danger from anarchists and strikers. "High Fliers and Low Fliers" are our native birds, as observed by W. Warren Brown. "The Young Corean Rebel," whose story Haddo Gordon narrates, was the leader of an important movement in the Hermit Kingdom 10 or 12 years ago. In "An Artist's Habitat," W. J. Linton, the well-known engraver, describes some of his belongings. George Grantham Bain writes of "Climbing the Social Ladder" in Washington.

SHARPSVILLE (Pa.) furnace is repairing explosion damage.

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Whether the tourist's fancy directs him to the New England States or the Atlantic seaboard; to the South; or to the lake region of the North; or to the Rocky Mountains and the wonderland beyond the Mississippi, he will be given opportunity to indulge his tastes at a small cost for railroad fare this year. There will be low rates to Baltimore over the Pennsylvania Lines in May, account the American Medical Association; to Decatur, Ill., account the German Baptist (Dunkard) meeting, and to Pittsburg for the Presbyterian General Assembly. There will also be low rates over these lines to Meridian, Miss., account the General Assembly Cumberland Presbyterian Church the same month. In June, excursion tickets will be sold over the Pennsylvania Lines to Omaha account the National Jr. O. U. A. M.; to Chattanooga, Tenn., for the International Convention of Epworth League; to Cleveland, Ohio, account the National Republican League Meeting, and to Roanoke, Va., for the German Baptist meeting. Excursions for July include low rates over the Pennsylvania to Baltimore for the Baptist Y. P. Union Meeting; to Asbury Park for the L. A. W. Meeting, and to Boston for the Christian Endeavor Convention, and to Denver, Col., account the National Educational Association meeting. In August, excursion tickets will be on sale over the Pennsylvania Lines to Boston, account the Knights Templar Conclave. The sale of low rate tickets will not be restricted to members of the organizations mentioned, but the public generally may take advantage of them.

In addition to the above, there will be plenty of other cheap excursions over the Pennsylvania Lines to various points. As the season is some weeks away, arrangements in detail have not been consummated, but it is certain that no railway will offer better inducements than the liberal concessions in rates and privileges that may be enjoyed by travelers over the Pennsylvania Lines. This fact may readily be ascertained upon application to any passenger or ticket agent of these lines, or by addressing F. Van Duzen, Chief Assistant General Passenger Agent, Pittsburg, Pa.

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AN interesting article in *Electric Power* for April is a description of the Sacramento-Folsom power transmission plant, with illustrations of the American river.

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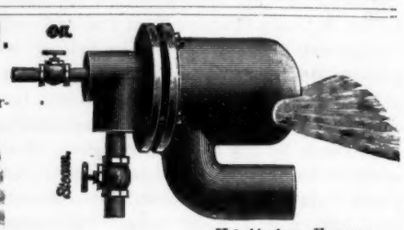

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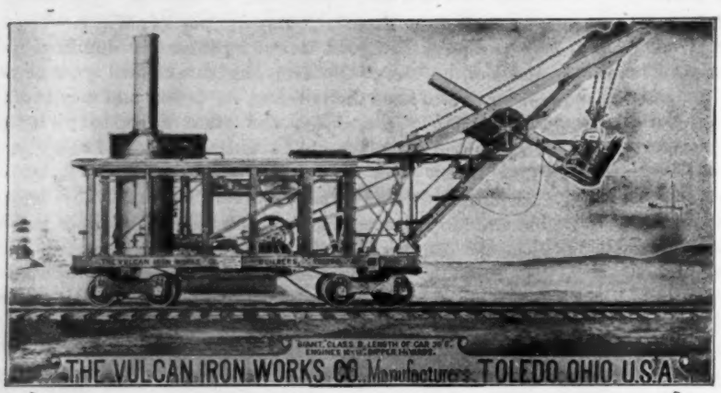

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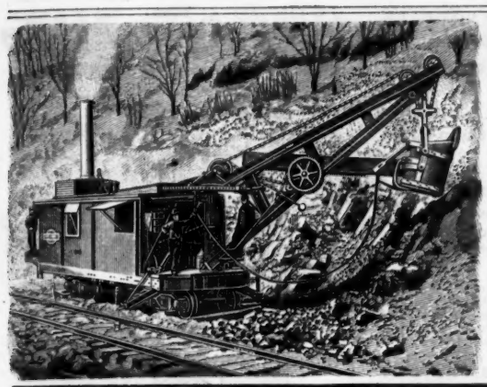

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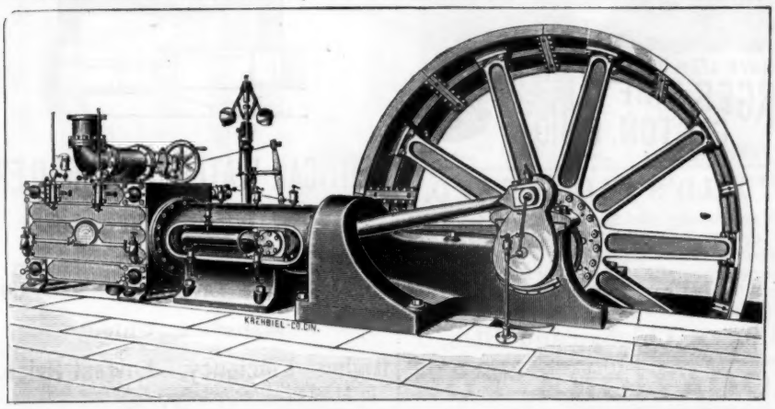

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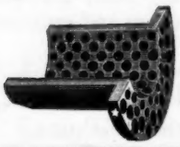

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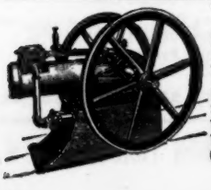

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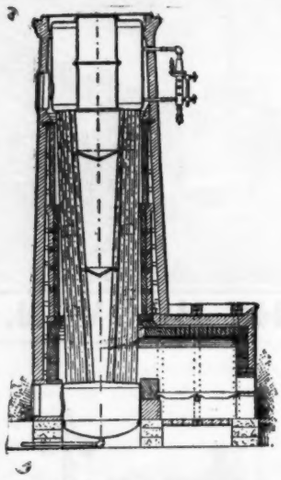

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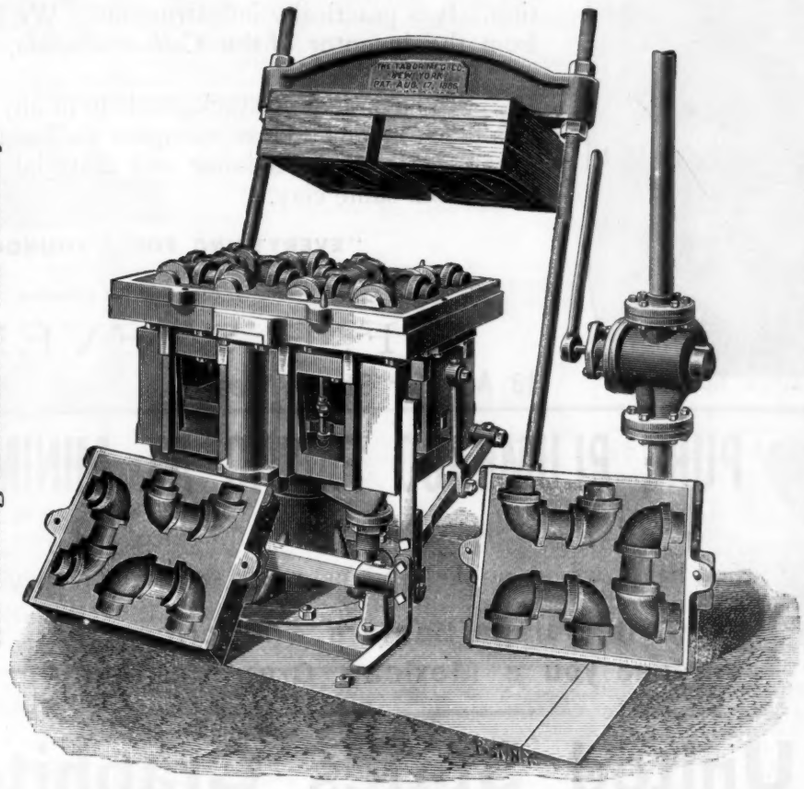

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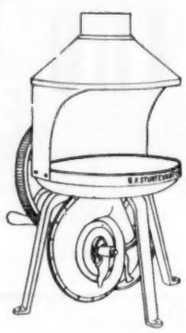

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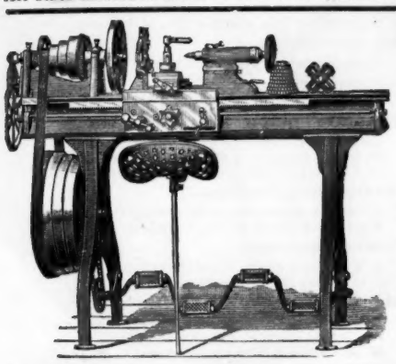

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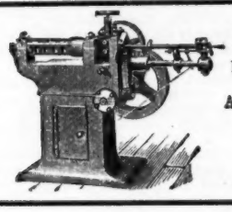

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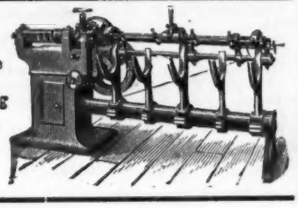

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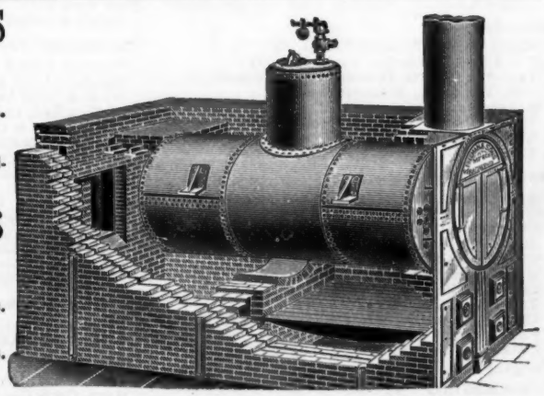

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Richard A. Parker, Marquette, Mich.
C. W. Hunt Co., New York City.
Jopling & Escobar, Cleveland, O.
John Fraser, Chicago, Ill.

Engineers' Supplies—
Ed. Wertheim, Chicago.
C. H. Besly & Co., Chicago, Ill.
Pittsburg Gauge Co., Pittsburg, Pa.

Engravers and Electrotypers—
Eclipse Electrotype & Engraving Co., Cleveland.
Cleveland Electrotype Foundry, Cleveland.

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Newell Bros., Cleveland, O.
Buckeye Mfg. Co., Union City, Ind.
Foos Gas Engine Co., Springfield, O.
Dayton Gas & Gasoline Engine Co., Dayton, O.

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C. H. Besly & Co., Chicago, Ill.

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Wm. Tod & Co., Youngstown, O.
Armstrong Bros., Springfield, O.
The John F. Byers Machine Co., Ravenna, O.
Totten & Hogg I. & S. F'dry Co., Pittsburg, Pa.
Lane & Bodley Co., Cincinnati, O.
Pen Argyl Iron Works, Pen Argyl, Pa.
Westinghouse Machine Co., Pittsburg, Pa.
B. F. Sturtevant Co., Boston, Mass.
The Edward P. Allis Co., Milwaukee, Wis.
The Hooven, Owens & Rentschler Co.
Willis Shaw, Chicago.

Exhaust Heating Apparatus—
B. F. Sturtevant Co., Boston, Mass.

Factory Sites—
Chicago Heights Land Association, Chicago.

Fans—
Buffalo Forge Co., Buffalo N. Y.
B. F. Sturtevant Co., Boston, Mass.

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Union Mining Co., Mt. Savage, Md.
Westmoreland Fire Brick Co., Pittsburg, Pa.
Oak Hill Fire Brick & Coal Co., Oak Hill, O.
American Fire Brick & Clay Co., Mineral Point, Ohio.
Reese, Hammond & Co., Bolivar, Pa.
Clearfield Fire Brick Co., Clearfield, Pa.
Milwaukee Fdy. Supply Co., Milwaukee, Wis.
Cleveland Facing Mill Co., Cleveland, O.
Stowe, Fuller & Co., Cleveland, O.
Dover Fire Brick Co., Cleveland.
F. B. Stevens, Detroit, Mich.

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Ed. Wertheim, Chicago.

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W. F. & John Barnes Co., Rockford, Ill.
Hill, Clarke & Co., Chicago, Ill.
New York Machinery Depot, 178 Broadway, New York City.
Lodge & Shipley Machine Tool Co., Cincinnati.

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Harn, Ow & Co., Beaver Falls, Pa.
The Lloyd-Booth Co., YoungstownO.
Taylor & Boggis Foundry Co., Cleveland, O.
Wm. Tod & Co., Youngstown, O.
S. Freeman & Sons Mfg. Co., Racine, Wis.
Vulcan Iron Works Co., Toledo, O.
Kurtz & Buhrer Foundry Co., Chicago, Ill.
The Hooven, Owens & Rentschler Co.

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Clearfield Fire Brick Co., Clearfield, Pa.
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Milwaukee Fdy. Supply Co., Milwaukee, Wis.
Cleveland Facing Mill Co., Cleveland, O.
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Thurman Fuel Oil Burner Co., Indianapolis, Ind

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American Fire Brick & Clay Co., Mineral Point, Ohio.
Milwaukee Fdy. Supply Co., Milwaukee, Wis.

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United States Graphite Co., Saginaw, Mich.

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Pen Argyl Iron Works, Pen Argyl, Pa.
W. A. Crook & Bro's Co., Newark, N. J.

Hoisting Blocks—
Moore Mfg. & Foundry Co., Milwaukee, Wis.

Hoisting Engines—
The John F. Byers Machine Co., Ravenna, O.
C. W. Hunt Co., New York City.
Pen Argyl Iron Works, Pen Argyl, Pa.
Vulcan Iron Works Co., Toledo, O.
W. A. Crook & Bro's Co., Newark, N. J.
The Edward P. Allis Co., Milwaukee, Wis.

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United States Heater Co., Detroit, Mich.

House Heaters—
United States Heater Co., Detroit, Mich.

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Ed. Wertheim, Chicago.
C. H. Besly & Co., Chicago, Ill.

Insurance Companies—
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Iron Nails and Steel—
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G. B. Schulte Sons Co., Cincinnati, O.
Bethlehem Iron Co., South Bethlehem, Pa.
C. H. Besly & Co., Chicago, Ill.

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Condit-Fuller Co., Cleveland.
E. C. Pope, Cleveland.
Forster, Hawes & Co., Chicago, Ill.

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Hill, Clarke & Co., Chicago, Ill.
Cincinnati Milling Machine Co., Cincinnati, O.
Fox Machine Co., Grand Rapids, Mich.
New York Machinery Depot, 178 Broadway, New York City.
Ed. Wertheim, Chicago.
Manufacturers' Tool Supply Co., Chicago.
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Armstrong Bros. Tool Co., Chicago, Ill.
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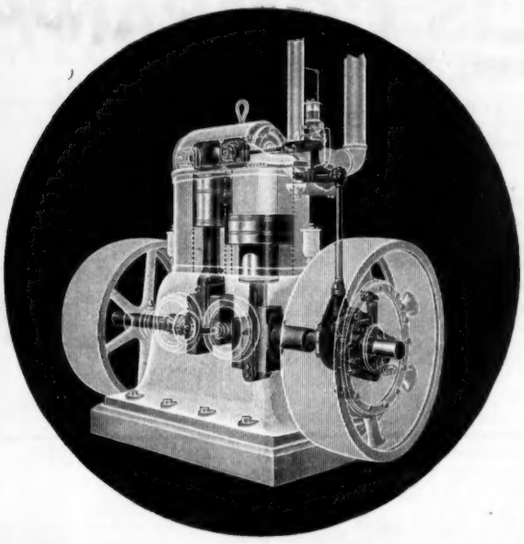
Illinois Screw Co., Chicago, Ill.
C. H. Besly & Co., Chicago, Ill.

Machine Shops—
Toledo Machine & Tool Co., Toledo, O.
Harn, Ow & Co., Beaver Falls, Pa.



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37 College St., CHARLOTTE, N. C.
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Metal Saws—
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Totten & Hogg I. & S. F'dry Co., Pittsburg, Pa.

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Empire Paint & Roofing Co., Philadelphia, Pa.

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Willis Shaw, Chicago.

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Long & Allstatter Co., Hamilton, O.

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Cleveland Rolling Mill Co., Cleveland.
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Lodge & Shipley Machine Tool Co., Cincinnati.

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C. H. Besly & Co., Chicago, Ill.

Steam Pipe and Boiler Covering—
Keasbey & Mattison Co , Ambler, Pa.
Ed. Wertheim, Chicago.
C. H. Besly & Co., Chicago Ill

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Bucyrus Steam Shovel & Dredge Co., Bucyrus, O.
Vulcan Iron Works Co., Toledo, O.

Steam Specialties—
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C. H. Besly & Co., Chicago, Ill.
Pittsburg Gauge Co., Pittsburg, Pa.

Steel—
Wm. Jessop & Sons, Ltd., New York, N. Y.

Steel Castings—
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Enterprise Boiler Co., Youngstown, O.

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Tin Plate—
Gummey, Spering & Co., Philadelphia, Pa.

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McCallip Fence Co., Columbus, O.

Wire Goods—
McCallip Fence Co., Columbus, O.

Wire Rope—
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C. W. Hunt Co., New York City.
George Cradock & Co., Chicago, Ill.

Wire Machinery—
John Adt & Son, New Haven, Conn.
Cady Mfg. Co., Cleveland, O.

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MILWAUKEE, WIS.

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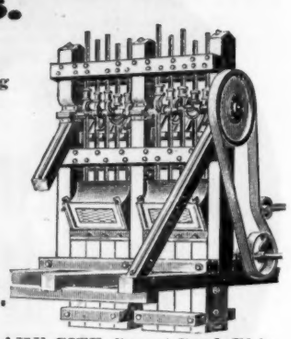

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The star (*) indicates that the adv. appears alternate weeks; the dagger (†) once a month; the double dagger (‡) once in three weeks; the parallel (‖) three times out of four.

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Via "C. & B. LINE,"

Commencing with opening of navigation (about April 1st). Magnificent side-wheel steel steamers

"State of Ohio" and "State of New York."

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Lv. Cleveland,	6:00 P.M.	Lv. Buffalo,	6:30 P.M.
Ar. Buffalo,	7:30 A.M.	Ar. Cleveland,	7:30 A.M.

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Cheap Excursions Weekly to Niagara Falls.

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W. F. HERMAN, Gen'l Pass. Agt. **T. F. NEWMAN,** Gen'l Manager.

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Steel Works, Rolling Mills and Blast Furnaces

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"THE IRON TRADE REVIEW"

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No. 1 Specular, Bessemer	3.05@ 3.40
No. 1 Bessemer hematite	2.90@ 3.00
Hematites No. 1 non-Bessemer	2.00@ 2.55
No 1 Specular, non-Bessemer	2.35@ 2.75

PIG IRON.

CLEVELAND (f. o. b. cars):

Bessemer	$10 95@$10 85
No. 1 Strong Foundry	10 75@ 11 00
No. 2 Strong Foundry	9 75@ 10 00
No. 1 Gray Forge, red short	9 25@ 0 00
No. 2 Gray Forge, neutral	9 00@ 00 00
No. 1 American Scotch	11 00@ 00 00
No. 2 American Scotch	10 00@ 00 00
Lake Superior Charcoal	13 00@ 13 50

PITTSBURG:

No. 1 Foundry	$10 75@$11 25
No. 2 Foundry	10 00@ 10 25
Gray Forge	9 25@ 0 00
White and Mottled	9 00@ 0 00
Warm Blast Charcoal	17 00@ 18 00
Cold Blast Charcoal	22 00@ 26 00
Bessemer	10 75@ 10 85

CHICAGO (reported by our representative:)

Lake Superior Charcoal	$13 00@$13 50
Local Coke Foundry No. 1	10 50@ 10 75
Local Coke Foundry No. 2	10 25@ 10 50
Local Coke Foundry No. 3	9 75@ 10 25
Local Scotch Foundry No. 1	10 50@ 10 75
Local Scotch Foundry No. 2	10 25@ 10 50
Local Scotch Foundry No. 3	9 75@ 10 25
Southern Coke No. 1	11 00@ 11 25
Southern Coke No. 2	10 00@ 10 25
Southern Coke No. 3	9 50@ 9 75
Southern No. 1 Soft	10 00@ 10 25
Southern No. 2 Soft	9 75@ 10 00
Southern Silveries No. 1	11 75@ 12 00
Southern Silveries No. 2	11 50@ 11 75
Jackson Co. Silveries	15 00@ 16 00
Ohio Silveries No. 1	14 00@ 14 50
Ohio Silveries No. 2	13 00@ 13 50
Ohio Strong Softeners	13 00@ 13 50
Alabama Car Wheel	17 50@ 18 00
Malleable Bessemer	11 25@ 11 50
Coke Bessemer	11 50@ 12 00

CINCINNATI (reported by Rogers, Brown & Co.)

Southern Coke No. 1, Foundry	$ 9 50@$10 00
Southern Coke No. 2 and No. 1 Soft	9 00@ 9 25
Hanging Rock Coke, No 1	11 50@ 12 00
Hanging Rock Charcoal No. 1, Fdy	15 00@ 16 50
Tennessee Charcoal No 1	13 00@ 14 00
Jackson County Stone Coal No 1	14 00@ 14 50
Southern Coke, Gray Forge	8 25@ 8 50
" " Mottled	8 00@ 8 25
Standard Alabama Car Wheel	15 00@ 16 00
Tennessee " "	14 50@ 15 00
Lake Superior " "	13 50@ 14 00

OLD RAILS AND SCRAP METAL.

[Prices paid by mills.]

	Gross Tons
Old iron rails	$12 50
Old steel rails	10 00
	Net Tons
No. 1 R. R. wrought scrap	$ 9 00
No. 1 wrought scrap	8 00
No. 1 Machine cast scrap	8 00
Iron axles	14 50
Axle turnings	7 50
Wrought turnings (free from cast)	6 50
Cast borings	5 50
Uncut wrought iron boilers	4 00
Steel boiler plates	8 00
Grate bars	5 50
Pipes and flues (clean)	7 00
Tank iron	7 50
Hoop and band iron	6 00
Sheet iron	5 50
Wrought drillings	6 50
Malleable iron	8 00

STRUCTURAL MATERIAL.

Beams and Channels (Cleveland mill)	1.30c@1.35c
Angles	1.20c@1.25c
Tees	1.35c@1.45c
Universal Plates	1.20c
Sheared Plates	1.30c

MERCHANT IRON AND STEEL.

[List prices out of store.]

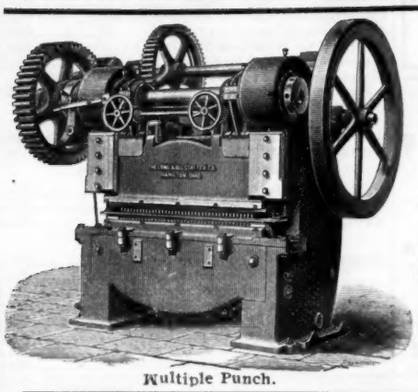
Flat Bar.

1½ to 4 by ⅜ to 1 inch	1 10
1½ to 6 by ⅜ to 1 inch	1 15
1¾ to 6 by 1½ to 2 inch	1 30
1¼ & 1¾ by ⅜ to ¾ inch	1 15
1 & 1⅛ by ⅜ to ¾ inch	1 20
⅝, ¾, ⅞, by ⅜ to ⅝ inch	1 30

Frank P. Cady, Pres. and Supt.
Geo. H. Bowler, Sec'y and Treas.
THE CADY MFG. CO.
18, 20 and 22 Johnson St., CLEVELAND, O.

SEND FOR OUR NEW CATALOGUE OF
Power Presses, Drop Hammers, Punches and Shears, Wire Working and Special Machinery.

PERFORATED METALS
OF ALL KINDS FOR
MILLING MINING AND AGRICULTURAL MACHINERY,
PERFORATED IRON, STEEL, COPPER, BRASS, TIN, ZINC, LEAD, ETC., TO ORDER.
LARGE AND VARIED ASSORTMENT OF SIZES. CORRESPONDENCE SOLICITED.
THE ROBERT AITCHISON. PERFORATED METAL CO.,
OFFICE, ROOM 510 265 TO 269 DEARBORN STREET, CHICAGO, ILL. WORKS SOUTH CHICAGO.


Multiple Punch.

—THE—
Long & Allstatter Co.
HAMILTON, O., U. S. A.
Manufacturers of Belt, Steam and Electrically driven
Power Punches and Shears,
for all kinds of Boiler, Tank and Structural Iron Work, Rolling Mills, Locomotive Shops, Car and Wagon Shops, Plow Shops, etc. Send for catalogue.

A. H. LEITCH, PREST. JOHN C. LEITCH, SEC. AND TREAS.

WESTMORELAND FIRE BRICK CO.
MANUFACTURERS OF HIGH GRADE FIRE BRICKS.
PITTSBURG, PA.
Works and Mines, Westmoreland, Pa.

DIXON'S GRAPHITE PAINT
FOR TIN OR SHINGLE ROOFS AND IRON WORK. IT IS ABSOLUTELY WITHOUT AN EQUAL.
Tin roofs well painted have not required repainting for 10 to 15 years.
If you need any paint it will pay you to send for circular.
JOSEPH DIXON CRUCIBLE CO., Jersey City, N. J.

IRON CLAD PAINT CO.
Factory, 75 & 77 Central Way. Sec. & Treas., No. 3 Case Build'g,
CLEVELAND, OHIO.
ORDER DIRECT FROM THE
Iron Clad Paint Co.
And get the genuine article, and save liability of suit for using an article made in violation of the patents issued to Wm. Green, and now owned by this Company.
IRON CLAD PAINT is the most durable, most fire-proof and Cheapest Paint made.
FURNISHED both Dry and Ground in Oil
USED BY NEARLY ALL THE RAILROADS.

Subscribe for the Iron Trade Review, $3 per year.

Round and Square.

1 to 1⅞ inch	1 10
2 to 2⅝ inch	1 20
2¾ to 3¼ inch	1 35
3⅜ to 4 inch	1 60
4⅛ to 4½ inch	2 20
4¾ to 5 inch	2 40

Oval.

⅜ to 1¼ inch	1 30
⅜ to ¾ inch	1 30
½	1 50
⅜	1 70

Half Oval and Half Round.

1¼ to 3 inch	1 65
⅜ to 1⅛ inch	1 45
⅜ to ¾ inch	1 70
½	1 85
⅜	2 95

Heavy Band.

1¼ to 6 by ¼ and 5-16 inch	1 20
1 to 1⅜ by ¼ and 5-16 inch	1 25
¾ to ⅞ by ¼ and 5-16 inch	1 35
½ to ⅝ by ¼ and 5-16 inch	1 60

Hoop Iron.

1 7-16 to 4, No. 13, 14, 15 and 16	1 65
1 7-16 to 2, No. 17, 18 and 19	1 70
1 7-16 to 2, No. 20	1 80
1 7-16 to 2, No. 21	1 90
1 7-16 to 2, No. 22	2 00
1⅛ to 1⅜, No. 13, 14 and 15	1 70
1⅛ to 1⅜, No. 16, 17 and 18	1 75
1⅛ to 1⅜, No 19 and 20	1 80
1⅛ to 1⅜, No. 21	1 90
1⅛ to 1⅜, No. 22	2 00
15-16 and 1 inch, No. 13, 14 and 15	1 65
15-16 and 1 inch, No. 16, 17 and 18	1 80
15-16 and 1 inch, No. 19 and 20	1 90
15-16 and 1 inch, No. 21	2 00
15-16 and 1 inch, No. 22	2 10
⅞, No. 13, 14 and 15	1 90
⅞, No. 16, 17 and 18	2 00
⅞, No. 19 and 20	2 10
⅞, No. 21	2 20
⅞, No. 22	2 30
13-16, No. 13, 14 and 15	2 00
13-16, No. 16, 17 and 18	2 10
13-16, No. 19 and 20	2 20
13-16, No. 21	2 30
13-16, No. 22	2 40
¾, No. 13, 14 and 15	2 10
¾, No. 16, 17 and 18	2 25
¾, No. 19 and 20	2 35
¾, No. 21	2 45
¾, No. 22	2 55
11-16, No. 13, 14 and 15	2 35
11-16, No. 16, 17 and 18	2 40
11-16, No. 19 and 20	2 50
11-16, No. 21	2 60
11-16, No. 22	2 70
11-16, No. 23	2 80
⅝, No. 13, 14 and 15	2 40
⅝, No. 16, 17 and 18	2 50
⅝, No. 19 and 20	2 60
⅝, No. 21	2 70
⅝, No. 22	2 80
⅝, No. 23	2 90
9-16, No. 13, 14 and 15	2 60
9-16, No. 16, 17 and 18	2 70
9-16, No. 19 and 20	2 80
9-16, No. 21	2 90
9-16, No. 22	3 00
9-16, No. 23	3 10
7-16 and ½ inch, No. 13, 14 and 15	2 80
7-16 and ½ inch, No. 16, 17 and 18	2 90
7-16 and ½ inch, No. 19 and 20	3 00
7-16 and ½ inch, No. 21	3 00
7-16 and ½ inch, No. 22	3 10
7-16 and ½ inch, No. 23	3 20
⅜, No. 13, 14 and 15	3 30
⅜, No. 16, 17 and 18	3 40
⅜, No. 19 and 20	3 50
⅜, No. 21	4 80
⅜, No. 22	3 90
⅜, No. 23	4 05

Light Band.

1½ to 6 by ⅛ to 3-16 inch	1 40
1½ to 6 by Nos. 11 and 12	1 45
1 to 1¾ by ⅛ to 3-16 inch	1 45
1 to 1¾ by Nos. 11 and 12	1 50
⅞ and 13-16 by ⅛ to 3-16 inch	1 60
⅞ and 13-16 by Nos. 11 and 12	1 65
¾ and 11-16 by ⅛ to 3-16 inch	1 70
¾ and 11-16 by Nos. 11 and 12	1 75
⅝ and 9-16 by ⅛ to 3-16 inch	1 85
⅝ and 9-16 by Nos. 11 and 12	1 90
½ by ⅜ to 3-16 inch	2 00
½ by Nos. 11 and 12	2 05

Wagon Box Iron.

⅞ inch, beveled edge, by Nos. 11 and 12	1 60
⅞ inch, " " " " 13 and 14	1 70
¾ inch, " " " " 11 and 12	1 75
¾ inch, " " " " 13 and 14	1 05

Sheet Iron.

No. 10	1 65
No. 12	1 75
No. 14	1 80
No. 15-17	1 90
No. 18	2 05
No. 20	2 20
No. 22-24	2 30
No. 25-26	2 40
No. 27	2 50

Steel Boiler Plates—1-4 in. and Heavier.

Tank	1 50
Shell	1 70
Flange	1 80
Marine Flange	2 10
Fire Box	3 00

Above includes plates 90 inches wide.

90 to 96 in. wide	½c. lb. extra
96 to 100 in. wide	1 c. "
100 to 104 in. wide	1½c. "
104 to 106 in. wide	special

American Cast Tool Steel.

ROUND, SQUARE AND OCTAGON.	cts. lbs.
1 to 2 in. inclusive	08
9-16 to ⅞ in. "	08½

HOISTING MACHINERY

for Mining, Quarrying, Coal Handling, Pile Driving, Bridge Building, Log Hauling, and for general Contractors' Use. Improved Electric Hoists, single and double Patent Friction Drum, compound, geared with brakes and reversible for general Hoisting, Mining Purposes and Suspension Cable Ways.

Send for Illustrated Catalogue giving full description, etc.

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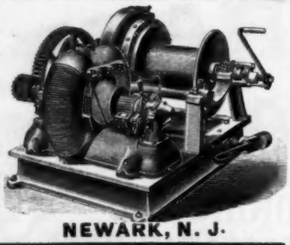

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For Hoisting and Conveying Purposes.

SECTIONAL TRACK, INDUSTRIAL AND CABLE RAILWAYS.
BARROWS, COAL BUCKETS, WIRE ROPE, TIP CARS, ETC.

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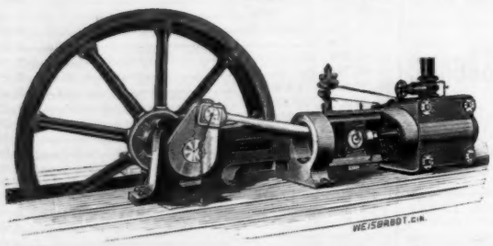

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ALL SIZES.

Simple and Compound.

Shafting, Hangers, Pulleys.

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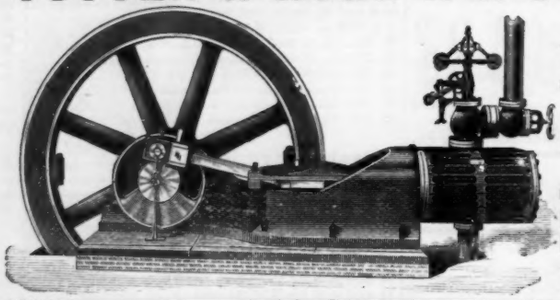

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Chilled and Sand Rolls and Rolling Mill Machinery.

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The Most Satisfactory Fire Brick That Money can Buy

Our well known brands

"O. K." Crown, "O. K." and "A"

They have no equal when used for the purpose designated. They are **good, honest, well made** Brick, **made** to hold **your** trade.

HOLMES, STRACHAN & CO., Agents, Detroit, Mich.

Oak Hill Fire Brick & Coal Co., Manufacturers, OAK HILL, OHIO.

7-16 to ⅜ and 2⅜ to 3 in.	.09
3⅛ to 4 in.	.09½
⅝ to 11-16 and 4½	.10
⅝ to 6 in.	.10½
⅞ to 9-32 and 6⅝ to 7 in.	.11
7⅛ in	.13

Flats.

	cts. ℔s.
2 to 9-16 in. wide by 2 to ⅝ thick	.8

Bessemer and O. H. Steel.

Machinery	base price,	1 50
Tire	"	1 60
Spring	"	2 10
Sleigh Shoe	"	2 00
Toe Calk	"	2 05
Cutter Shoes, tapered and bent	"	2 10

English Tool Steel.

Jessop's	15½c
Hobson's "Best"	15½c
" "Choice"	35c

Burden Boiler Rivets.

½, ⅝, 11-16 and ¾ inches diameter	3 30
Bridge ½, ⅝, 11-16 and ¾ inch diam.	3 00

MACHINERY SUPPLY MARKET.

Anvils.

American	℔ 9@10
Wright's	℔ 12

Bellows.

Blacksmiths'	Hill's	dis 40
	Bullock's	dis 50&10
Moulders'		dis 40@40&10
Hand		dis 40&10@50

Belting.

Boston Belting Co.'s standard	dis 70
" " " extra	dis 60&5
" " " best	dis 55
Cleveland Rubber Co. extra standard	dis 60&10
Hoyt's Short Lap	dis 45
Shultz Raw Hide Leather Belting, single,	dis 40
Munson's Short Lap Single Leather	dis 50
Munson's Short Lap Double and Light Double Leather	dis 50&10
Shultz Raw Hide Leather Belting, Double and Light Double	dis 40
Standard, oak tanned	dis 50&10
Alexander Brothers' pure oak tanned	dis

Blowers and Exhausters.

B. F. Sturtevant's	dis 20
Boston Blower Co.,	dis 35
Buffalo	dis 40

Chucks.

Cushman's 4 Jaw Independent	dis 45
" Combination	dis 40
" Geared Scroll	dis 30
" 2 Jaw Brass Workers	dis 30
" Drill	dis 35
Wescott's Scroll Combination	dis 33⅓
" Independent	dis 40
" Little Giant Drill	dis 35
Horton's Universal	dis40
" Independent	dis 45
Whiton's Independent	dis 45
National Combination	dis 40
Sweetland "	dis 40
Almond Drill	dis 20
Morse "	dis 15
Skinner's Combination Lathe	dis 40&10
" Independent Lathe	dis 40&10
" Universal Lathe	dis 40&10
" Drill	dis 20

Cutters and Reamers.

Cleveland	dis 10@15
Pratt & Whitney	dis 10@15
Standard	dis 10@15
Morse	dis 15
Brown & Sharpe, Milling Cutters	dis 15
" " Gear Cutters	dis 15

Crowbars.

Cast Steel	℔ 3½
Iron, steel points	℔ lb 3

Drill and Drill Sockets.

Twist Drills	dis 50&10
Morse Taper and Straight Shank to 1½"	dis 50&10
Morse Taper and Straight Shank Larger than 1½"	dis 25
Drill Sockets	dis 25
Standard Twist Drills	dis 55@55&5
Cleveland " "	dis 55@55&5

Emery.

	No. 4 to No. 54 46 gr.	150 gr.	F. FF.
Kegs, ℔	4½c	5 c	2½c
½ kegs ℔	4¾c	5¼c	2¾c
¼ kegs ℔	5 c	5½c	3 c
10 ℔ cans, 10 in case	6 c	6½c	5 c
10 ℔ cans less than 10	10 c	10 c	7½c

Emery Cloth and Paper.

Barder, Adamson & Co.	dis 50@50&5
H. H. Barton	dis 50@50&5

Emery Wheels.

Detroit	dis 60@70
Norton's	dis 60@70
Grant	dis 60@70
Sterling	dis 60@70
Celluloid	dis 10&33⅓
Northampton	dis 55
Crystal	dis 65@70
Vitrified	dis 60@70
Vulcanite	dis 60&10
Hamden	dis 60&10@70
Cyclone	dis 60@60&10

Files.

Arcade	dis 60&10@60&10&10
Nicholson	dis 60&10@60&10&10
" X. F	dis 25
Kearney & Foot	dis 60&10@60&10&10
Black Diamond	dis 60&10@60&10&10
McClellan	dis 60&10@60&10&10
Disston's	dis 65@70

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BUILDING DEPARTMENT.

SPECIALTIES: STEEL AND IRON BUILDINGS FOR ROLLING-MILLS, TIN PLATE PLANTS, STEEL WORKS, FOUNDRIES, FACTORIES, ROOF TRUSSES, GIRDERS, COLUMNS, BEAMS, CORRUGATED IRON, ETC.

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On your castings that you want emoved?

If so,

FOR CLEANING METAL CASTINGS & THE SURFACES OF METALS. The ACME CHEMICAL SOLUTION. TRADE MARK. C.C.S.MNF'G.CO

Will clean them better than any other method.

Try It.

Chicago Chemical Solution Mfg. Co.
41 Lakeside Bldg., CHICAGO, ILL.

Cleveland Union Station.

Pennsylvania Lines.

Foot of Bank Street.

TICKET OFFICES at Station, Euclid Av., Woodland Av., and Weddell House corner.

THROUGH TRAINS RUN AS FOLLOWS BY CENTRAL TIME
* Daily. † Daily, except Sunday.

FROM CLEVELAND TO	LEAVE	ARRIVE
Pittsburgh and Bellaire	† 7:00 am	†12:10 pm
Salem and Pittsburg	* 8:00 am	* 8:30 pm
Pittsburgh, Bellaire and East	†12:45 pm	† 6:25 pm
Philadelphia and New York	* 1:40 pm	*11:25 am
Baltimore and Washington	* 1:40 pm	*11:25 am
Alliance and Pittsburgh	* 1:40 pm	*11:25 am
Ravenna and Alliance	† 3:25 pm	† 9:50 am
Hudson and Ravenna	* 5:00 pm	* 8:25 am
Philadelphia and New York	*11:10 pm	* 5:25 am
Baltimore and Washington	*11:10 pm	* 5:25 am
Alliance and Pittsburgh	*11:10 pm	* 5:25 am

Mt. Vernon and Pan-Handle Route

FROM CLEVELAND TO	LEAVE	ARRIVE
Xenia and Cincinnati	* 8:40 am	* 5:15 pm
Akron and Columbus	* 8:40 am	*5:15 pm
Akron, Columbus & Zanesville	†12:45 pm	*12:10 pm
Akron and Orrville	† 3:25 pm	† 9.50 am
Columbus and Cincinnati	* 8:00 pm	* 6:55 am

Saturdays the 8:00 pm train will leave at 11:20 pm.

Valley Ry.

Depot foot of So. Water St.
City Office 137 Superior St.

	Arrive.	Depart.
Akron & Canton	*6:30 P M	*7:10 A M
Akron, Canton & Valley Jctn.	*10:10 A M	*3:15 P M
Valley Jctn. & Way Stations	†6:30 P M	†7:10 A M
Akron, Canton & Chicago	*8:00 A M	*6:30 P M
Wooster and Chicago	†2:45 P M	†11:00 A M
Wooster		†6:30 P M
Akron, Canton & Marietta	†2:45 P M	†11:00 A M
Steubenville, Wheeling, Washington, D. C., and Baltimore	†2:45 P M	†11:00 A M

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A Practical Tool.
Saves Forging, Tool Steel and Time.
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Successors to Tuttle, Oglebay & Co.

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IRON ORES,

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If you are thinking of enlarging your mill, foundry or machine shop, or of purchasing machinery of any kind, send us a line giving character of machinery needed. We can put you in communication with manufacturers from whom you can buy advantageously.

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WM. B. FRANKLIN, Vice-President.
F. B. ALLEN, Second Vice-President.
J. B. PIERCE, Secretary and Treas.

HARTFORD STEAM BOILER INSPECTION AND INSURANCE CO. HARTFORD, CONN.

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C. A. BURWELL, Chief Inspector, 208 Superior St., Cleveland O.

J. E. WOLCOTT, Special Agent, 96 4th Avenue, Pittsburgh, Pa.

Western	dis 70
Stub's	dis 25
Grobet's	dis 30
Reynolds Bros.' Hand Cut	dis 50
Industry File Works Hand Cut	dis 50

Hammers.

P. S. W	dis 40
Atha new list, Jan. 15, 1887	dis 50
Heavy hammers and sledges under 5 lbs	12c
" " " " over 5 lbs	10c

Jack Screws.

Illinois Bolt Co. list	dis 75

Nuts and Washers.

Size of bolt inches	¼	5-16	⅜	½	⅝	¾	1
Square	8	7	5½	4¾	4	3¾	3⅛
Hexagon	15½	11½	8½	6	5¾	5¼	
Washers	9	8	7	5	4½	4½	4½

In lots less than 100 lbs, ₩ lb add ½c., 1 lb boxes add 1c to list.

Nails (wire).

List July 14, 1887	dis 85
Standard Penny Nails, ₩ keg card rate	
{ Car lots	$1.05
{ Less than car lots	$1.15

Oilers.

Zinc and Tin	dis 60
Brass and Copper	dis 50
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ₩ doz	dis 10@10&10

Picks.

Railroads, 5 to 6 lbs	$12 dis 60
" 6 to 7 lbs	$13 dis 60

Pulleys.

Iron Pulleys, Walker List	dis 50
Medart Pulleys	dis 50
Split Wood Pulleys	dis 55@60

Pulley Blocks.

Moore's Anti-Friction Diferential Chain Pulley Block	dis 20

Rivets.

Iron, Thousand, list November 1, 1894	dis 60@65
Iron, Ordinary, Cooper's Block and Carriage list November 1, 1894	dis 60@65
Copper	dis 50@50&10

Taps.

Cards, Hand and Nut to 2 in	dis 50
Carpenters' " " "	dis 50
Morse " " "	dis 50
Pratt & Whitney " " new list	dis 10
Machine Screw Taps	dis 55
Pipe Taps to 2½ in	dis 70
Stay Bolt Taps	dis 25
Stove Bolt Taps	dis 55
Pulley Taps	dis 40

Vises.

Solid Box	dis 60
Parker's	dis 20@25
Prentiss	dis 20
Stephen's	dis 25@30
Barrett's	dis 30
Miller's Falls	dis 40
Merrill's	dis 15@20
Howard	dis 35

Wire.

New List, Apr. 9, 1894

Brass	dis 40
Copper	dis 40
Bright and annealed, Nos. 0@18	dis 70&10@75
" " Nos. 19@26	dis 75@75& 5
" " Nos. 27@36	dis 75&10& 5
Coppered Nos. 0 to 18, market list	dis 70@70& 5
Galvanized Nos. 0 to 18 " "	dis65& 5
Tinned market Nos. 0 to 18	dis 57½
Cast steel	dis 50
Tinned Broom Wire	dis 70&5@70&10
Annealed Fence, Nos. 8 and 9	dis 75
Annealed Grape, Nos. 10 to 14	dis 75
Stub's Steel Wire regular	95c ₩ lb dis 30

Wrenches.

Coe's genuine	dis 50
Girard Standard	dis 70&10
Agricultural	dis 75&10
Mechanic's	dis 55&10& 5
Bemis & Call's Combination	dis 35
Donohue's Engineers	dis 20&10
Lamson & Sessions Engineers	dis 60
Billings & Spencer's Drop Forged	dis 25
William's " "	dis 25
Alligator " "	dis 40

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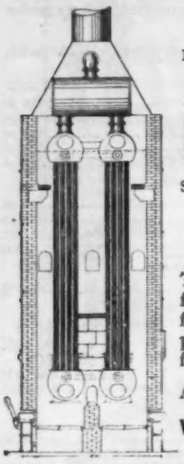

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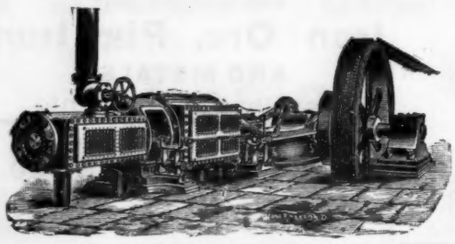

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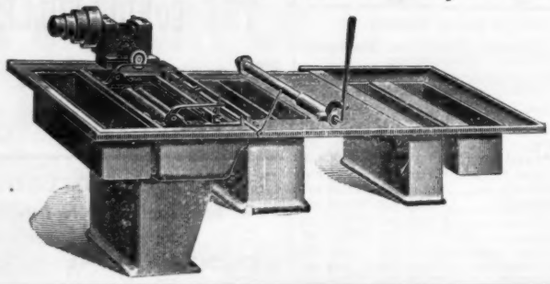

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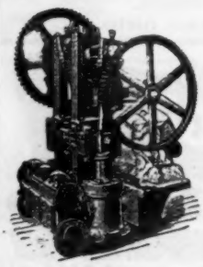

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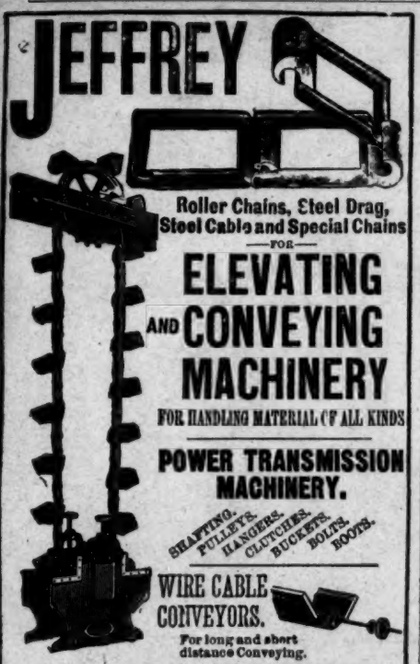

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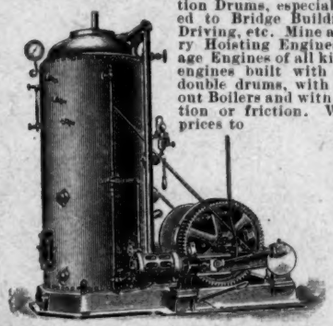

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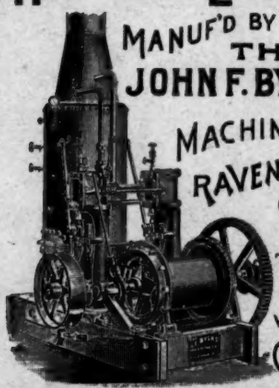

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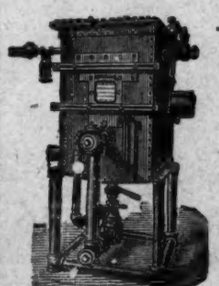

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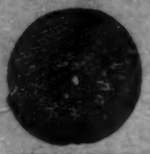

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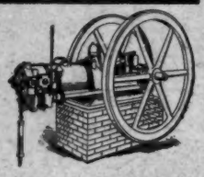

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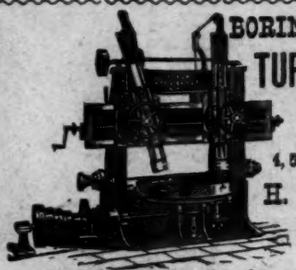

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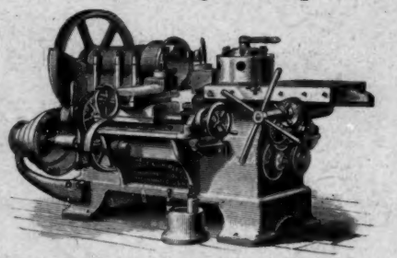

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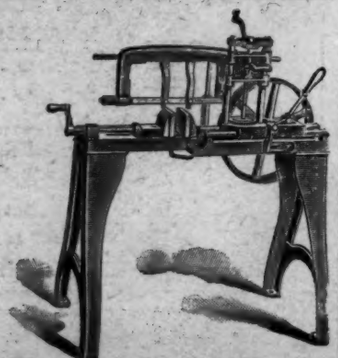

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